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- Innovative multiplayer mixes indoor and outdoor fighting, vehicle combat and the use of implants.



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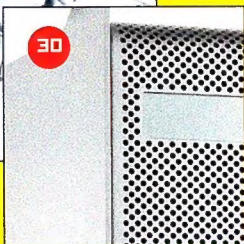
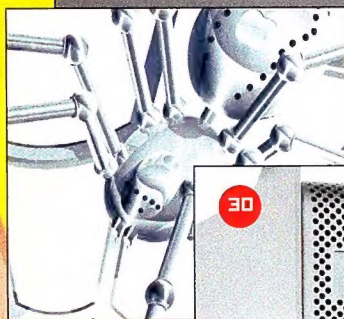
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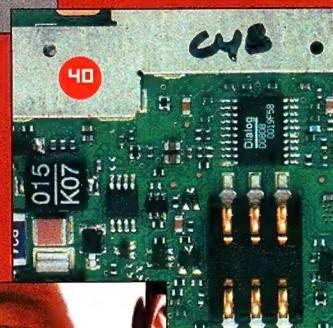
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Have it home delivered, it's the sensible way.

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Driving tech

We run our computers for many reasons, but at the end of the day (literally, usually) we run games. While we enjoy the gaming experience, we are naturally intrigued to know what drives what it is we play. Whether it's how the AI functions, or the trickery which powers the graphics engine, or even the way one game is optimised for up to four very different platforms – we ponder such cleverness while mindlessly being swept along by the gameplay.

For some of us, the curiosity of what powers a game transcends the experience itself. How often have you installed a game demo just to check out how the 3D engine looks? Gameplay be damned, we just want to see what our sophisticated silicon investment is capable of, and how the whitecoats who make the games exploit the hardware.

Here at *Atomic* we have done many features covering just that topic. Every little corner of it. It's a magic topic that deserves more. So, we're giving it more.

Yes, it is the heralding of a new section in *Atomic*. All part of the evolution. It's Engine Room. James Wang kicks off the Room and rightly so. There is no one who is better able to explain the innards of a game engine than James. He's been contributing to *Atomic* almost since the beginning and is one of the best tech writers in this country. Helping James will be the *Atomic* staff - John and Logan are particularly keen to get stuck into this hot new part of the mag. Engine Room sits alongside Scanner, which is our Game News section, but with a hard focus on gaming hardware and technology. You know - the good stuff, the stuff that we do best.

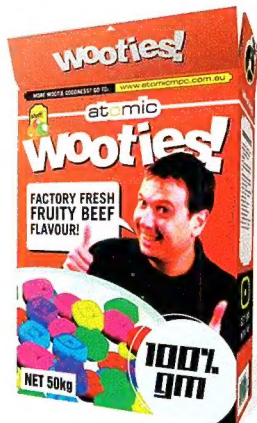
Engine Room shows that *Atomic* is a games mag for the smarter gamer. We hope you get a thrill from the new games tech we'll uncover, after all, what is sexier than a 3D engine peeled naked? Hmmmm?

Ahhh - it feels great, sitting in this Editor's chair. We really do have the best tech writers in the country, and I know I can say that, hand on heart. There's award-winning John G, Dan Rutter (Dan the man), Ashton Mills, Tim Dean, James Wang, Dr Carlo Kopp, Simon 'PhR33x' Peppercorn, Ron 'Modjitsu' Prouse and the new generation - Logan Booker and Nathan Davis. Nothing can touch the breadth of maturity and professional expertise at *Atomic*.

Something else that's special about *Atomic* this month, is the cover CD! You know - we all know - that there would be no *Atomic* cover CD unless it was damn special. We've done two CDs in the past, and each was unique. So is this one. Craig Simms (a.k.a. evilbasta) put it together for us. He's the guy who draws Crashtest and is working with us more and more, the CD is his latest piece of *Atomic* magic. Give it a spin, you'll see that it's more than your average coverdisc.

Have a go of it!

Ben Mansill
Editor



atomic

MAXIMUM POWER COMPUTING

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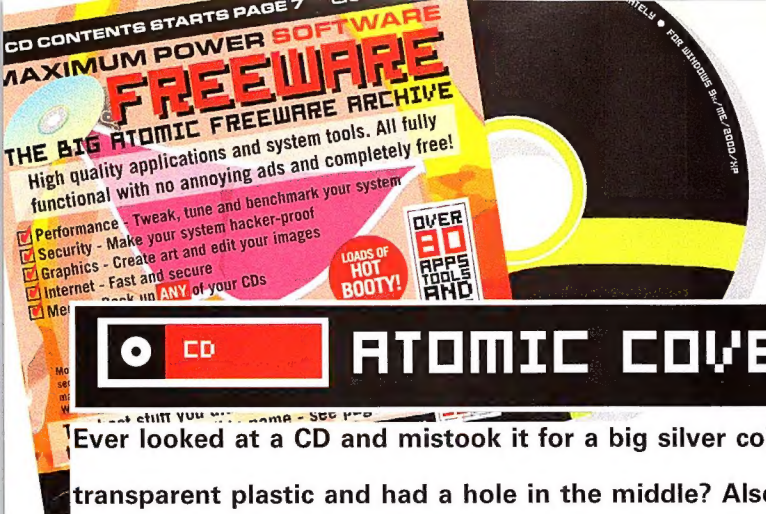
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Atomic: All submissions must be the original work of the person submitting, and submitted works become the property of AJB Publishing.

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April 2002 - March 2003:
27,310



ATOMIC COVER CD GUIDE

Ever looked at a CD and mistook it for a big silver coin, except it was made of semi-transparent plastic and had a hole in the middle? Also, there's the fact that no one would ever give you money for it. Well, the *Atomic* CD is big and useful, and you don't have to pay a cent for it either.

There's no such thing as a free lunch, but there does exist the free cover CD, and this month's *Atomic* brings you the shiny joy of a free disc brimming with useful stuff.

Face it – software is expensive. For the average Atomican, shelling out a grand for software you'll perhaps use once, or for educational needs is, well, nasty.

Enter those who strive to make the software world a better place. Whether their desire is to undermine the stranglehold of commercial solutions, finish a lifelong project or to simply give back to the community, the result is the same: free software.

Unfortunately you can easily spend hours, sometimes days, tracking down a suitable app for the task, traipsing through the most obscure, dank parts of the Internet. Don't you wish that someone else could do all the work for you? Well, that's exactly what we've done, being the lovable, huggable people we are. It's all on CD. We've even divided it into sections for easy reference: Benchmarking; Internet; Graphics; Media and Utilities.

What are you waiting for? Stick the CD in and delve into the Big Atomic Freeware Archive!

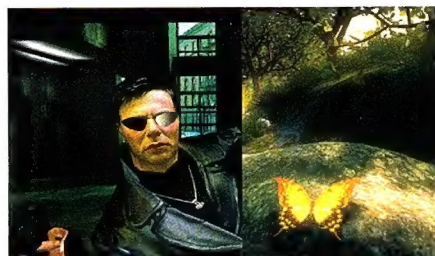
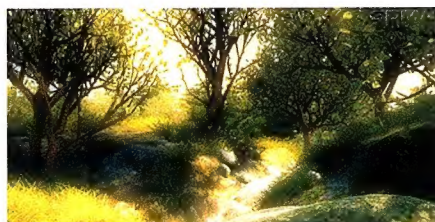
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- MemTest86 3.0
- Motherboard Monitor 5.3.3.0
- Nero CD tool suite
- Q3Bench 2.00/RTCWBench 3.00
- Realstorm Benchmark 1.10
- Rightmark Audio Analyzer 5.1



➔ 3DMark2001SE Pro Build 330

Okay, so you're still wondering if all this synthetic benchmarking malarky is what it's cut out to be after the recent shenanigans by NVIDIA and ATI. Despite a increasing trend towards pure game benchmarks, 3DMark2001 still features strongly among many test suites.

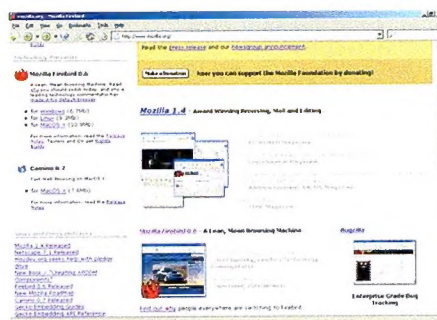
➔ 3DMark03 Build 330

A lot of controversy has surrounded this follow-up to 3DMark2001, in regards to its usefulness as a benchmark. Still, it's a mandatory tool at LANs for sparking envy among friends by being able to run the Nature Test with everything turned on and scoring the highest.

Internet

➔ Mozilla FireBird 0.6

The way Internet browsers should be – light, fast and free. With support for tabbed browsing, pop-up blocking and more, FireBird represents the future of the Mozilla browser.



GRAPHICS

■ CONTENTS

- Snico Edit 1.5



GIMP 1.2.5

If you're only doing image-editing, who needs Photoshop? GIMP provides most of the functionality, and it's absolutely free!

Sodipodi 0.32

Until recently, vector editing suites have either been in the domain of incredibly basic, or incredibly expensive. Sodipodi changes all that, offering a fully featured program for no more cost than your time.



GET CRACKING
WITH GIMP AND
SODIPODI, AND
SEND YOUR
CREATIVE
GENIUS INTO
art^omic!

Media

➔ Audacity 1.0.0

Audacity is a multi-track audio editor that can export audio as WAV, MP3 or Ogg. It also offers a range of digital processing effects to give your sound files that extra 'oomph'.

➔ Media Player Classic 6.4.5.8

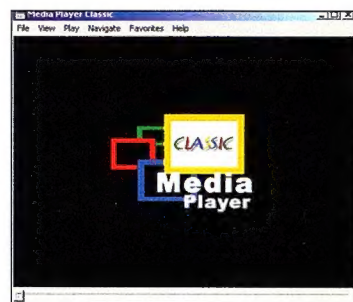
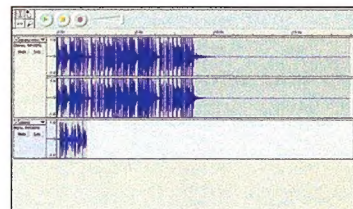
Media Player Classic is an incredibly flexible, er, media player in the style of, er, media player. With a dazzling array of features, MPC supports video/audio filters, subtitling, multiple audio tracks, an army of keyboard shortcuts, plus can playback several formats including QuickTime and RealPlayer (if the host applications are installed) as well as Ogg and Matroska, along with anything the standard media player can.

➔ CamStudio 2.0

CamStudio allows you to record what's happening on your screen, complete with sound annotations! Extraordinarily useful for recording tutorials or information-based videos, you could even use it for bug testing or feasibly to record a game demo.

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- XP-Antispy 3.71
- ZipMax 0.41

➔ OpenOffice.org 1.1RC

The ultimate Microsoft Office replacement, OpenOffice.org contains a word processor, spreadsheet program, presentation suite and drawing/layout program.

➔ Adobe Acrobat Reader 6.0

Adobe's new PDF reader sports an entirely redesigned interface, layers and the ability to embed and playback QuickTime, RealMedia, MP3, Flash and Windows Media content.

OpenOffice.org
Source Project



HELP!

The CD interface loads via a Web browser. It should automatically run when you insert your CD into the drive. All files, where possible, have been provided as executable installers. Where not possible, they have been included as ZIP files.

To run an installer directly from the CD using:

➔ Internet Explorer 5

Simply click on the provided 'Download' link. The 'File Download' dialog box should appear. Choose 'Run this program from its current location' and click 'OK'.

➔ Internet Explorer 6

Simply click on the provided Download link. The 'File Download' dialog box should appear. Choose 'Open'.

Other Web browsers may require you to access the install files directly through a file manager such as Windows Explorer, as they may not support the direct opening of files through the Web interface.

To access installers or programs found within ZIP files on the CD, you will need to either save it from the disc to your hard drive, or open the file on the CD and extract the contents to your hard drive using a suitable application such as WinRAR (www.rarlabs.com), WinZip (www.winzip.com) or UltimateZip (www.ultimatezip.com).

It is recommended that you read any supplied documentation before installing the relevant software on your system.



VirusScan^{7.0}

Stop viruses and keep hackers out of your PC

This cover CD has been checked with McAfee VirusScan 7.0 with the latest virus definitions at the time of mastering. Although all CDs are thoroughly checked for errors and viruses, AJB Publishing cannot accept any responsibility for any loss or damage to your hardware, software or data that may occur as a direct or indirect result of using the CDs or the data they contain.

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SHORT CIRCUITS

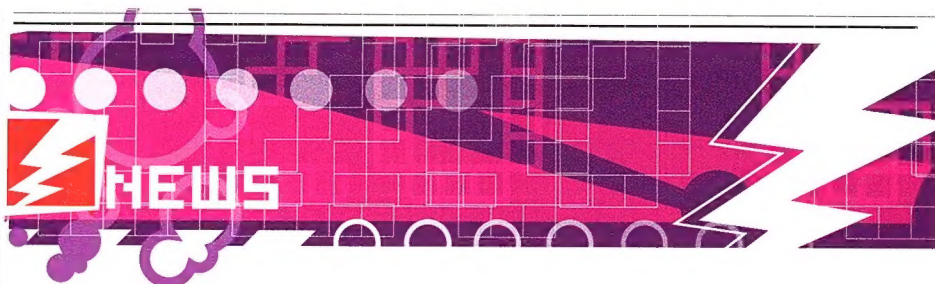
◀ Seems like Windows critical flaw month – if it's not buffer overflows from MIDI files, it's exploits in DCOM and RPC. A patch has been released to fix the problem (check out Microsoft's Website); however, hackers already have code out to take advantage of systems without the update.

Apparently, it's a 'fundamental flaw' in the DCOM and RPC architecture, and can cause things such as drag-and-drop functionality to screw up. Oh, and it allows hackers into your system, too.

◀ Queensland is the home for game developers in Australia. Maybe it's the sun, or the fish. More than likely it's the babes though.

Well, its State Government is in agreement, and has launched the 'Interactive Games Development Package' to assist developers in acquiring dev kits for consoles and to improve their business skills. MP Paul Lucas at the launch at Auran said: 'We want to ensure the Smart State's top creative talent is best placed to tap into this lucrative industry, and this new support package will ensure our games companies get the skills and international exposure they need to do this.' Most excellent to hear.

◀ The Seven Network and Blue Gamers are after a host to present a new TV show that will talk to gamers about, well, gaming. They're after someone with plenty of knowledge on tactics and gameplay, as well as games in general. The host will also get involved with 'on-air' interviews. You need to be 18 years of age or older, and be able to talk to a camera. If you're interested, visit www.bluegamers.com.au for more details, or email enquiries@bluegamers.com.au.



HotBOTY 2003

There's something daunting about the smell of competition. It can be especially overwhelming when all you can do is twiddle your thumbs in fierce contemplation. But then, quite unexpectedly, it can have your briefs tingling as though a family of ferrets is making its home in your underclothes.

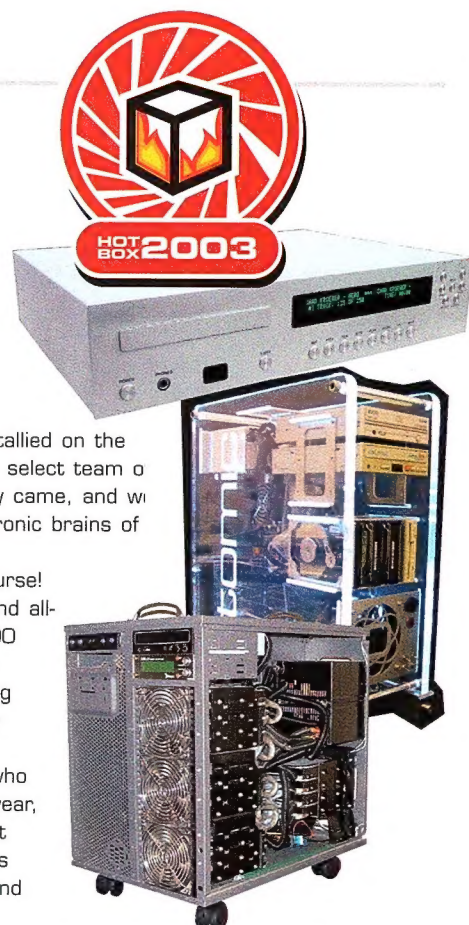
This raw feeling of nether-region joy is called excitement, son, and it doesn't get more lively and exciting than HotBOTY.

For an entire month, HotBOTY votes were tallied on the Atomic Website (www.atomicmpc.com.au) by our select team of coffee-powered robots. On 16 July, the big day came, and we downloaded the results directly from the positronic brains of our coffee-bots.

So, who won? Mark's Aural Decipher of course! That's right, Mark White, genius box builder and all-round happy Atomican, won himself the \$4,500 prize (donated kindly by Compucon) featured in *issue 30*. Coming in close behind were the Dog Boxes in second, and Patrick's Futile box in an honourable third.

Congratulations to Mark, and to everyone who had a box in the competition. Now, until next year, we're back to normal Hot Box activities. So get over to *page 20* and check out those gorgeous machines! Then get to www.atomicmpc.com.au and place your vote!

As for the Jolt cola and iStarZone venue naming competitions, their results will be available next month – so watch this space and keep those ferrets fed!



Sony's Mini MIPS

Sony's little super package, the PlayStation Portable (PSP), looks like it's had its specs solidified. A Sony press release has revealed that the PSP will be one mighty hand-held media system. Yep, it'll do more than just play games – it'll be the answer to all your music, video and gaming needs.

Along with two main MIPS R4000 32-bit cores, the PSP will have a pair of graphics chips to handle its 2D and 3D requirements. The main processor will pack 8MB of eDRAM, run at a maximum speed of 333MHz, and be connect via a 128-bit bus. Its companion has a similar configuration, minus 6MB of eDRAM.

As for the graphics cores, the main processor will support many popular 3D functions, including compressed textures, B-spline (NURBS) and curved surfaces. The second core is hooked up via a 256-bit bus and will come with 2MB of eDRAM. The PSP's graphics power will be similar to that of the Voodoo 5 (fillrate-wise) and in all likeness, much more capable. The unit will also have support for a variety of sound and video formats, as well as wireless functionality and USB 2.0 and IrDA ports.

Sony plans to show the unit at next year's E3, but don't expect the PSP until the end of 2004.

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AUS EGAMER

This month saw the running of the first ever E-sports world cup in Pointiers, France.

Counter-Strike saw our qualifying team Function zero0 put in a good show. Though unfortunately facing the might of Schroet Kommando in their group seeding. F-zero went on to down EA and TT to secure entrance to the next round. A smashing loss to GoodGame and draws to both 4Kings and nEph took them out of contention however. In the end, the mighty Team9 took down zEx 16-7 on de_dust2.

As for UT2003, eVenfLoW took out Horac with ease, but suffered a crushing defeat to GitzZz.

eVenfLoW was placed alongside the likes of F4tal1ty and Viruz-2kr, and lost three consecutive matches, ousting him from the competition. After the smoke had cleared it was GitzZz who took the crown.

The Warcraft III front saw Australian hopeful Raggy take down 2A.Ironclad. He then lost to aT.fatC and andyf. The finals saw MaDFroG down HeMan.

The Quake III exhibition tournament certainly lived up to the hype. Australia's most successful pro-gamer, Python, was in attendance and well received after his excellent performance at last year's WCG. Python took down both St_Germain and Akiles before succumbing to the power of cha0ticz and ProZac. Bad luck to the best Aussie Quaker ever. The Russians proved they are still the kings of the Arena with Cooler placing first and Lexter third.

For more information check www.auspantheon.com/eswc.
Stuart Denham

Bitboys deliver XBA for PDA

Let's face it, Bitboys has not had the best run in the cutthroat world of PC graphics. Since the very dawn of desktop 3D it has tried time and again to deliver a physical product. Last we heard of Bitboys they had scrapped plans for the desktop based Avalanche 3D product lines (thanks to Infineon abandoning its eDRAM plans last year) and shifted focus to the mobile space.

Now from the company that brought us such timelessly non-existent products as Pyramid 3D, Avalanche 3D and Axe comes a new product name, Acceleon. This is Bitboys latest great hope for commercial success, a three tiered product line aimed at a range of mobile 3D applications.

At the basic end there is the Acceleon G10, a vector processing engine designed for 2D and basic triangle acceleration. Stepping up there is the Acceleon G20, which adds support for features like texturing and surface shading onto the basic functions and at the top end is the Acceleon G30, a power-laden pocket beast which not only accelerates the triangles and the textures, it also adds support for advanced features like mip-mapping and Z-buffering and provides support for the early revision of the Khronos group's OpenGL ES (embedded systems) standard. And thanks to Bitboys' architecture, users get 'free' antialiasing as well, with no performance loss.

This marks the official arrival of the second PC graphics refuge in mobile land. PowerVR was screwed royally when its hardware T&L-free KYRO technology became a casualty of the feature war waged between NVIDIA and ATI. It has been pimping its PowerVR MBX core for a while now, even though we are yet to see mobile devices incorporating the technology.

atomican

Now is the winter of satisfaction. Only a few days away is the annual Atomic super Sydney m337. Now with v3.0 goodness, most of your favourite Atomicans will be there to chew the fat, knock back the alcomohol and engage in some away from computer activity. More details at www.atomicmpc.com.au/forums.asp?s=1&c=5&t=285.

Last month also saw another battle rage on the paintballing fields. It was a chance to see if all those years of CS and any other FPS would pay off. 30+ Atomicans running around with gun-like objects is definitely a scary sight to behold. Piking was at a minimum, but then 'we know what happens to Atomic Paintball pikers'. One Atomican, who shall remain nameless, was glad he brought a box on the day.

Hundreds of years from now, aliens might look back on the Atomic Forums and wonder what kind of advanced life inhabited it. One thing they'll definitely see is the fantastic level of creative writing from Atomicans in the year 2003 and even two times the POTMness this month. Their job will be made easier by 1shot1kill's Atomic authors thread (forums.asp?s=1&c=1&t=16527). So good was it that the Gods decided to make Atomic authors a permanent feature of the site, with a release date of 'soon'.

The Atomic IRC channel on Austnet, #atomicmpc, now has it's own Website. www.atomicirc.com is where you should head for all your channel needs (even complaining about Nazi ops!) Under development by super Praetorian, it'll soon become a veritable hub of IRC delightfulness. Coupled with neophyte's winning design entry (forums.asp?s=1&c=1&t=16437), it's sure to be fantastic when it's finished.

With help, self-confessed cam, forum, and 'I write people's names on my forehead' whore, morris, has come up with an excellent magazine FAQ. It's the best place to go if you have a magazine enquiry, and it'll be satisfied faster than issue 6 sold out. Browser your way to forums.asp?s=1&c=3&t=605 to get FAQed.

And remember even though your mouth might be making cheques your body can't cash, it hurts less than getting your tongue stuck in the slot of an ATM.

Wilkshake

POTM 32

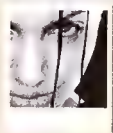
In an unprecedented Atomic event - we have no choice but to award two POTMs. Each was as good as the other, taking us all on high-speed adrenaline rides - real-life versions too.

One man's personal land speed record, by the dude www.atomicmpc.com.au/forums.asp?s=1&c=1&t=16184

Against the SAMS - another combat flying story, by chrisg www.atomicmpc.com.au/forums.asp?s=1&c=1&t=16390

Logitech has come through with twice the prizeness, woot be to it.

WHAT'S HOT



- PowerPC - the RISC-ey Business
- Angelina Jolie - enough said
- S.T.A.L.K.E.R. - gaming heaven
- GSM/GPRS - Phone SIMplicity
- White phosphorus - smokin'

WHAT'S HOT



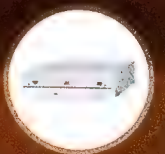
- Pentium 4 - less RISC, more hype
- Lara Croft - enough already
- The Stalker - arthouse movie hell
- CDMA - overclocked analog
- Ice - damn cool

SONY



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Creativity multiplied

The modding community is responsible for some of the best games of our time. Imagine what would have been possible if we had tapped into that talent from the start.

After getting some new hardware recently, I decided to pull out that old FPS crippler *Morrowind* in the hopes the new beast machine could smack it a new framerate. Somehow, I thought an overclocked 3200+ Barton and overclocked Ti4800SE would be able to show it some sweet lovin'. Yet *Morrowind* again proved how clunky the NetImmerse engine is. I gained a mere five FPS, upping the speed to a whopping 30 frames average.

Still, while it's certainly one of the slowest engines ever to grace an adventurer's PC, it's also one of the most charming to the eyes. So I decided to play, but – wanting the best gameplay experience – not before downloading some of the better game-enhancing

This, obviously, is to say nothing of the thousands of mods for every other game under the sun that we know and love, new and old. Even *Total Annihilation*, which I remember reviewing for Ben back in the PCPP days, had mods being updated and released just last year!

And *Half Life*, of course, put modding on the map. In fact if I look at my favourite games in the past two years,

While *Morrowind* has remained fairly patch-free, it's older brother *Daggerfall* is probably the most patched title in the history of PC gaming. Along with fix after fix for quests, characters, serious bugs and crashes, the community had to pitch in and develop a magic item fixer and quest/character fixer. To this day, the game is still plagued by 'save slot' corruption.

in line with the vision of the game would make it in. Obviously there's an infrastructure with the processing and selecting of submissions, but this is achievable with the number of staff most development houses have, whereas the volume of content that they can now draw from would never be possible to produce on their own.

And everybody wins. Those modders whose work is accepted get a return – perhaps they get the game free and, in a subscription-based model, the subscription too. Not to mention the pride of knowing other people are appreciating their work – the primary reason why most people go to the trouble of creating mods in the first place, only this time commercially supported on a grand scale.

It all depends on how much work is accepted. I wouldn't rule out a business model that provides a financial return too, keeping in mind the selected content becomes the property of the developer house.

The developers and publishers win by having a more detailed and expansive product they couldn't possibly produce with just their own comparatively limited resources, and as a result sell more copies. And the end gamer wins as they get a massive, detailed, and more in-depth game on a level they hadn't experienced before.

Such a model allows the developers to produce what they might normally write off as impossible simply due to the man-hours normally required to create so much content. By tapping into the creativity of passionate and talented people the world over, something like the next *Evercrack* *MIMORPG* could be populated by a mind-bogglingly massive, detailed, and absorbing universe.

After all, that's always been the biggest complaint about games hasn't it? They're always too short, too small, or too easy.

I'd love to see what could be possible when the creative power of hundreds of people is harnessed in the development of a game.

Perhaps then games like *Star Wars Galaxies* could live up to their names. ☺

And the end gamer wins as they get a massive, detailed, and more in-depth game on a level they hadn't experienced before.

mods that I knew existed from when I first explored the game over a year ago.

Yegads! The *Morrowind* community, far from shrinking over time, had grown and there were now literally over 2,000 mods scattered across a variety of sites. I know there were this many because, being the perfectionist that I am (or perhaps, just mentally deranged) I browsed through every single one to create an 'uber' list of the best mods to balance, enhance and add to the game. I downloaded a boatload, tested them, and made a list of a select few.

All up, collated into a single directory, the fifty odd mods (see I was picky!) add some 600MB of content to the game, everything from revamped creatures, hi-res textures to replace the default ones, and hundreds of megs of new atmospheric sounds. It's a totally different game, and leagues better than the version Bethesda originally released.

And it got me thinking.

Here we have a game that – through the work of talented gamers – has been added to, tweaked, and improved to be something I don't think anyone could ever have imagined it to be. And they're all free, made by passionate gamers for passionate gamers.

most of them are mods of games, some I played a great deal longer than the game itself.

So why not harness this creativity of the gaming public and integrate modding into the original design process? Imagine a realm of game development that maximises the creative potential of thousands of people to produce the ultimate in gaming entertainment – it might work something like this: the game company builds the engine and the core content, and then publishes both a developer kit or construction set (much like many developers already do now). Along with these however a set of design guidelines and a call for content are also published, requesting submissions for artwork, sounds, scripting, level and landmass design, goals and quests, and so on as appropriate to the title.

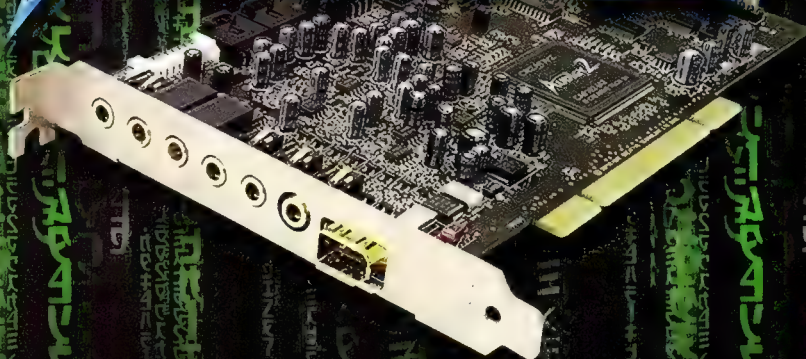
To each of these areas, in-house developers could oversee submissions and manage the incoming content, accepting those that meet the requirements, providing feedback on promising additions that require more work to be accepted, and turning down those that fall short.

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The dark side

Apparently the force of dollars can have a rather strong influence on the weak-minded marketing executive.

hey'll never learn. I thought they had. But they haven't.

Now, I'm no rocket scientist, but I reckon it's reasonable to think you should release a product to market when it's finished. Hey, call me radical and forward thinking, but selling a car with one wheel missing and no handbrake will probably just end in tears.

I understand that software is funny stuff. It has an uncanny tendency to turn on you as soon as you look away for a moment. I know programming is no walk in the park, and that before you know it code can get out of hand. But that's no excuse for sloppy work.

I also reckon every time a game is released with bugs, baby Jesus cries.

My first real hands on experience with a show-stopping bugfest was back in

Hang on, I think I see a pattern forming here. Both were released in November. And November is the month before December. And Christmas is in December. And lots of people buy games for Christmas. Nah, it's probably nothing.

The good thing, though, was that after *Ultima Ascension*, we all learnt a little something. Something about ourselves. Something about responsibility. And more importantly, the games publishers learnt that the public backlash and shithouse sales that result from releasing an unfinished game don't go far towards paying the costs of developing it that far.

So, here we are. 2003. The sun is shining (ever more brightly, according to global warming theorists. . .), the birds are chirping (more often responding to

(probably one of the pioneers here www.sonyonline.com/corp/company_info/bios.jsp) made the decision that the bugs that were left were good enough that the gaming public could experience them first-hand.

There are also no vehicles, and no Jedi. What's with that? When I think of *Star Wars*, I think of that hash-fiend Yoda (there's a warning in that, kids), then things like X-Wings, lightsabres, AT-ATs, aliens and TIE fighters (there are aliens in the game, at least).

The thing that really floors me about *SWG* is that, unlike *Falcon 4* and *Ultima Ascension*, it was released well before December. So why, oh why, did it have to happen like this?

There is a very significant backlash erupting over in the US over this. Quite justifiably, a great number of gamers are asking why they should be paying US\$15/month (that's around \$23 in the old money - ie, ours) to continue the beta testing program for *SWG*. You know, it's quite telling when a game ships with a bug reporting .exe built in. . . And that's not even mentioning the severe server problems.

There's no denying the game is good, but this is said in the same way there's no denying *Falcon 4* and *Ultima Ascension* were good. They are good in principle, and assuming there were no bugs, and the game ran at a reasonable pace on most hardware, then it would be an awesome gaming experience. Unfortunately, another nail in the coffin of *SWG* is the developers are using the fact it's a MMORPG as an excuse to ship it without all the promised features, with them releasing new features in patches down the track.

Frankly, I'm over it. I was over it when *Falcon 4* let me down, and I was well past it when *Ultima Ascension* came and went. So, what's to make me even think about going anywhere near *SWG*?

Well, thankfully, the decision has been taken out of my hands, as there are no plans I've heard indicating an Australian, or even Asian, server will be set up at any point in the future. Maybe one day though. Then we can all have fun beta testing down here. . .

I'm no rocket scientist, but I reckon it's reasonable to think you should release a product to market when it's finished.

November 1998 with *Falcon 4*. To this day it remains one of my favourite games of all times, and along with that bastard little computerised chess set I had when I was a teenager, it's also the source of some of the most potent fury I've ever experienced.

The game was great, but rampant over-ambition and a narrow-minded and tight-arsed publisher fused in an almighty Shazaam of shenanigans, the end result being it released before it was finished. It took a number of official and fan-created patches to get the game working anywhere near the lofty aspirations of the original vision. And it's only on today's hardware that it even runs at a decent speed with the settings turned up.

Then there was November 1999. Enter a new contender for the 'More Bugs Than The Cave Door Scene In Indiana Jones And The Temple Of Doom' award. Congratulations *Ultima IX: Ascension* for wasting everyone's time.

Another game with huge potential, amazing graphics, and huge ambitions that also happened to be unplayable out of the box. Also another game with a short-sighted publisher who decided to push the game out by Christmas.

polyphonic ring tones than other potential mates. . .), Apple is selling the fastest desktop computer in the world (except for the Pentium 4, Athlon XP, Xeon and Opteron, of course), ATI has finally made it to the top of the performance heap in 3D (well, it's a little hard to tell as ATI and NVIDIA won't stop cheating for long enough for anyone to measure their performance) and *Star Wars Galaxies* has finally shipped (well, in the US).

SWG. . . Another game with lofty aspirations, ground breaking graphics, massive scope, and a publisher with as much foresight as a deep ocean angler fish. And no vehicles too, I might add.

So I say again: they'll never learn. Even when they do learn, much like deep ocean angler fish, they have very short memories and before you know it, they've forgotten again.

It doesn't take a brain surgeon to see that *SWG* was released before it was finished. The core game was finished some time ago, and it's been undergoing a significant period of beta testing (although beta testers had to pay US\$5 for the privilege of working for Sony Online Entertainment and reporting bugs), but someone, somewhere

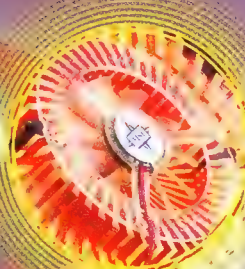


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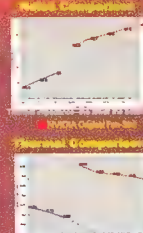
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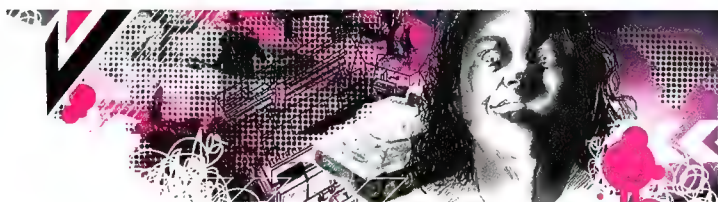
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Sizing up screens

Well, it's better than sizing up other things. . . ahem. Dan Rutter answers the question of the mega-super-screen TV: How many dots, and do the inches really count?

It's a question that has mystified humankind for all of history:

What TV (that costs less than a new car) should you get, in order to enjoy image quality as good as you get from your PC monitor? Like, 1,600 x 1,200?

(OK, actually this is a question that Ben Mansill asked me. But let's get on with it anyway, shall we?)

Regrettably Ben, there is no such TV. Non-high-definition TVs have a hard time resolving even 640 x 480 pixels. Some more expensive CRT TVs can manage a vaguely plausible 800 x 600 - more horizontal, less vertical, for 16:9 widescreen sets.

The reason for this is that the distance you view a TV from means it doesn't need super resolution.

Over there on the other side of the

lounge room TV. However, two or three metres is more common.

At 1.5 metres, 60dpi would be adequate. At two, three and four metres you would be talking 45, 30 and 22.5dpi.

If we wave our hands a bit more and assume that paper dpis are directly transferable to monitor dpis, then our next helpful factoid is that the standard rule-of-thumb computer monitor dpi is 72. Nothing but small, super-high-res laptop LCD panels are going to manage more than 100dpi.

CRTs can be told to display very high resolutions, but they don't really have fine enough phosphor dots to do a whole lot more than 72dpi.

A 19-inch monitor with a 36cm horizontal dimension will be running out

under their quoted diagonal size), but 640 x 480 will be the approximate limit of its resolving power.

640 x 480 on that TV would look as good as anything can look to you, resolution-wise at least, at a distance of three metres.

Move the screen closer and keep it the same size and you could use more resolution; move it away and keep it the same size and you could get away with even lower resolution. Though you probably wouldn't want to, for other reasons; good-sized TVs with really low-res tubes are often cheap and fairly nasty crap. And after all this, there's the bleeding Kell factor.

Interlaced video - which is what you get from every normal, non-progressive-scan TV - has lower vertical resolution than you'd expect. Interlace itself eats some detail, and so do filtering measures taken to reduce interlace flicker. All of this is collectively known as the 'Kell factor' - see

<http://members.aol.com/ajaynejr/kell.htm>.

The Kell factor is part of why 1080i HDTV (1,080 horizontal lines, interlaced) looks worse than 720p (720 lines, progressive scan).

So what's the take-home message?

If your CRT TV's a regular decent quality consumer model without flat square, DSP-enhanced, progressive comb-filtered, dual-overhead induction intercoolers, then its diagonal size multiplied by about four or five tells you how close you can sit to it and not need any more screen resolution.

If the set's a fancier high-end model with 0.4mm-ish dot pitch, then you can probably sit about 2.5 to three times the set's diagonal size away from it before you start seeing the grain, as it were. 1,600 x 1,200, though, ain't gonna happen with any normal TV. Even terrifyingly expensive plasma panel displays don't approach that resolution; they're not expected to be viewed from close enough that they'd need to.

You can get 1,600 x 1,200 from a 'UXGA' video projector; though. One of those can currently be yours for not a lot more than US\$20,000.

So you'd better start saving, Ben. ☐

This is where I handwave everything but visual acuity, because the other variables involve Nasty Calculations.

lounge room, your eyes can't resolve much better than 640 x 480, unless the room's pretty tiny or the screen's pretty vast.

Figuring out what you can actually see at a particular distance and with a particular screen size is tricky.

The screen size and distance part of the equation is simple maths - move it twice as far away and the screen has to be twice as big for the same possible apparent detail, duh - but there are lots of other variables. Your personal visual acuity, of course, but also the nature of the target image - contrast, brightness and so on.

This is where I handwave everything but visual acuity, because the other variables involve Nasty Calculations.

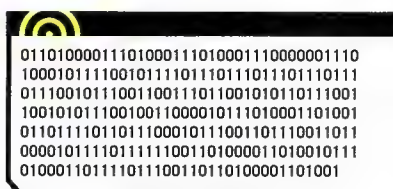
It's a general rule of thumb that 300 dots per inch (DPI) is all you need for something to look perfect under fairly close inspection (30cm away) by a person with 20/20 vision.

If you take 300dpi at 30cm to be your blazing gold standard for resolution, then 150dpi at 60cm is acceptable, and so on.

I think 1.5 metres would be about the minimum viewing distance for a

of phosphor dots above 1,280 x 960, and 1,280 pixels across 36 centimetres is 90dpi.

Now, this is a computer monitor, with a dot pitch (distance, diagonally, from any phosphor to its nearest



identically coloured neighbours) of around 0.23mm.

TV manufacturers seldom even quote dot pitches for their sets, but you can bet on a mainstream \$700-ish 68cm set not being significantly finer than 0.7mm. If it's got a nice bright aperture grille tube, its effective dot pitch is likely to be even worse. The highest quality TV CRTs manage something around 0.4mm.

A 0.7mm-pitch 68cm TV has a 27-inch viewable diagonal, 1.5 times bigger than the 18 inches of a 19-inch monitor (TVs, unlike CRT monitors, don't generally rip you off by one inch

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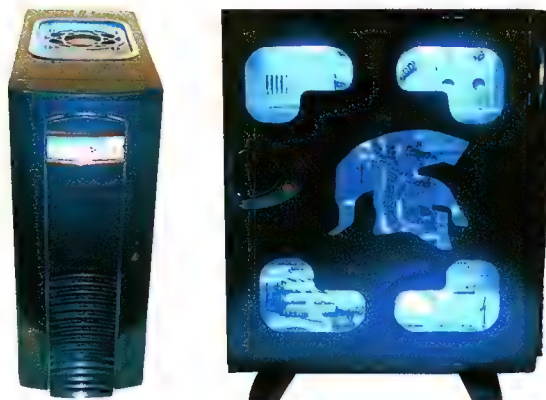
ASUSTeK COMPUTER INC.
<http://www.asus.com>



HOTBOX



Flaminspartan's iCe BlueBehemoth



I've always modded my case, but it's always been small mods. So I decided to pour all my resources into one case and deck it out. I had a rough idea of what I wanted and after searching for a case I picked an absolute gem. After prying out every rivet/nut/screw I was off. It took me four months of dremeling, mainly getting rid of a lot of the internals. I also needed to get the Spartan head and top window perfect so spent a lot of time on it. I was over the

moon with the paint finish, especially the experimentation I had to do to get the right colour. Yup, it's a mirror finish all over. Finally the finishing touches. I cut a blow hole in the Perspex, not the case, for the top window and stuck Perspex on the side. Surprisingly, I managed to stick the case back together without much drama. I then added some chrome edging, an LCD, cathodes, fans, custom bay-bus and a pinch of grills, resulting in a tasty case for all to enjoy.

TECHNICAL DETAILS

- Pentium 4 2.53B @ 3.26Hz
- Gigabyte 8INXP Deluxe
- Two 256MB Corsair XMS3500
- ATI Sapphire RADEON 9700
- 120GB Seagate 8MB Serial ATA
- 40GB Western Digital 8MB
- Lite-On 48x/24x/48x CD-RW
- Lite-On 16x DVD
- Antec True Power 550W PSU
- Lost In Space - LCD and a custom bay-bus
- Rounded, PSU cables in black cable wrap
- 120mm blowhole with chrome Atomic grill
- Two 80mm fans with chrome biohazard grills
- Two 12-inch blue cold cathodes

Lord Shaper's Furnace



It started with a 12-inch cathode after that, The Furnace started to take form. I cut strips either side of the drive bays. I then backed the holes with plastic and got two 6-inch cathodes behind it to glow brighter than Darth Maul's lightsaber! Two 6-inch cathodes went inside to finish lighting the case and give an even spread of light.

All of the optical and floppy drives were taken out and sprayed black. A red laser LED was also placed inside the

front bezel of the case to shine on the front intake grill and USB ports. The next part was to get the LCD up and running. Passing the cables for it through the back of the tower and to the USB and serial.

All internal cables were bound with cable ties and the cables placed out of the way to increase airflow in the case.

And last but not least I got a 'Pure Evil' case badge to top off the tower for the time being.

TECHNICAL DETAILS

- Athlon XP 2000+
- 512MB PC2700 DDR RAM
- MSI KT3 Ultra motherboard
- GeForce4 Ti4400
- SB Live!
- AOpen 52x/24x/52x burner
- Pioneer DVD-ROM
- Red Lost In Space LCD display
- Seagate 60GB Barracuda
- D-Link 10/100 NIC
- Nostromo speed pad
- Logitech MX500 (soon to be modded)
- DV152 Mitsubishi 15-inch LCD
- Sexy red glow effect

MetalZone by David



TECHNICAL DETAILS

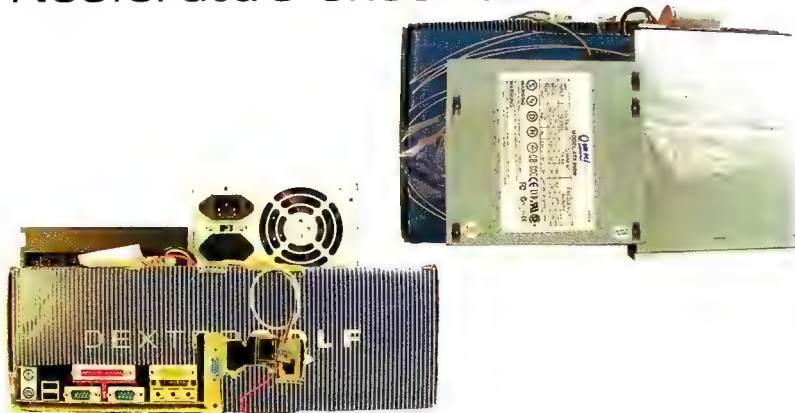
- AMD Athlon XP 1800+ @ 2000+
- MSI K7T266 Pro2-RU
- 768MB PC2700 Kingmax
- ASUS GeForce2 MX400
- 40GB Maxtor 7,200rpm
- 20GB Maxtor 5,400rpm
- Creative Sound Blaster Live!
- Creative Digital iR 52x CD-ROM
- Lite-On 12x/10x/32x CD-RW
- D-Link 10/100 NIC
- Pinnacle PCTV
- Philips 107T monitor
- Two blue cold cathodes
- Shimmery sheeny shine

I did this mod some time ago after being inspired by *Atomic*. Covering the side panel with masking tape, I started hacking with a jigsaw followed by lots of sanding. I decided to drill lots of holes for the top blowhole, but upon removing the masking tape, I was shocked to discover that the holes were out of shape. Determined to change my fate, I cut a square out of the mess. After all the metalwork on the case was done, I wanted to spray-paint it silver. However, my dad

suggested electroplating it. So we did. The end result was beyond my expectations. The chromed surface surpassed a 'mirror finish' paintjob.

I decided to make my own 'grill' for the top blowhole using red Perspex. After initially cracking the Perspex, it turned out perfectly the second time. I also put wire mesh beneath it to make it look cool and to keep dust out. A raised stainless steel floor and a hacked PSU case at the top hid the wires.

Nosferatu's shoeBox



TECHNICAL DETAILS

- Pentium III 700MHz (slot)
- 384MB RAM
- Mandrake Linux 9.0
- Two NICs
- Yum-cha motherboard
- Golf shoebox
- Bare wire on/off
- 2cm ventilation hole
- *Atomic* Firewall
- DHCP (well, I thought it was an achievement)
- Apache
- Telstra Cable (Optus wasn't on our street)
- Crappy monitor/keyboard/mouse
- 'Cheap' look

I had some spare parts left over after I sold my dad my old (but still good) motherboard, CPU and RAM.

I wanted to build a computer for a Linux box, but alas, I had no case for the parts.

I was thinking how I could do it, when I came across the box for my golf shoes still lying on my bedroom floor,

three months after I had bought them.

I set to work with a Stanley knife and some sticky tape. About 15 minutes later, I had it!

I didn't have a power switch handy so I ran a CD-ROM audio cable out of the box. Now all I have to do is jump the two wires to turn it on!



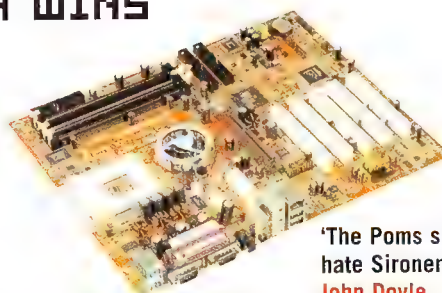
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- AGP 8x
- SATA RAID support
- IEEE 1394
- Dual DDR400
- 5.1 onboard sound + LAN



'The Poms sure hate Sironen.'
John Doyle

1 ANDREW ROLLINGS AND ERNEST ADAMS ON GAME DESIGN

SUPPLIER: Penguin Books Australia
WEBSITE: www.newriders.com
PHONE: (02) 8204 3318 PRICE: \$79.95

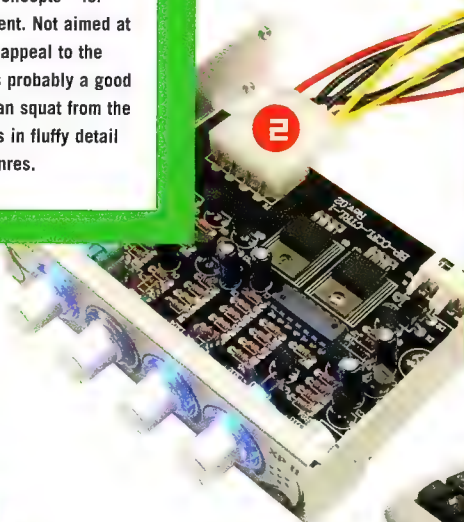
Game Design is a 500-words-a-page book that tries at being a 'tech' manual. It's a solid read on the formalities of design and gameplay concepts – for those with no background in its content. Not aimed at die-hard gamers, Andrew and Ernest appeal to the simple folk of management. Which is probably a good thing, as most 'core gamers' will glean squat from the last 10 or so chapters, which discuss in fluffy detail the aspects of our favourite game genres.



2 X-PANEL II - 3.5 COLD CATHODE CONTROL CENTRE

SUPPLIER: PC Range
WEBSITE: www.pcrange.biz
PHONE: (08) 8322 9544 PRICE: \$31

The XP II won't let you peer through walls, but it'll easily provoke those nearby into a fit. Managing up to four cathodes, you can change their strobing frequency, light amount and sound sensitivity thanks to the in-built microphone. It's quite the looker, constructed from Aluminium (also comes in black) with a blue LED above each knob. A cheap yet worthy addition for those desperately looking for that extra piece of kit. Trippalicious!



3 ROUND COLD CATHODE FAN

SUPPLIER: PC Range
WEBSITE: www.pcrange.biz
PHONE: (08) 8322 9544 PRICE: \$25

Fans suck (hah!) and are liberally boring. To rectify this platitudinous problem, we are seeing all sorts of flashy bits attached to them. Like, ironically, lights. This quiet 2,500rpm case fan has a circular cold cathode around its front rim. It also comes with two '3D grills', each with a slightly different design – ready for some changin' action. Available in four colours (red, green, blue or UV), this is a funky addition to your luminescent needs.



4 R4 RECHARGEABLE WIRELESS DESKTOP KIT

SUPPLIER: Anyware
WEBSITE: www.anyware.com.au
PHONE: (03) 9763 8200 PRICE: \$95

Here's an RF wireless keyboard and mouse whose receiver acts as a recharger for the provided mouse AAAs (keyboard uses AAs – not rechargeable). The distance is neat, useable a good ten meters away and the mouse is a smooth runner. The keys are A-shaped, apparently an ergonomic decision (gobbledygook) – distracting at first, but you get used to it. Not for the elite hax0r requiring lowest-latency human interfacing, but great for an entertainment setup.



5 WARCOM WIRELESS ADSL ROUTER

SUPPLIER: Netbro / Warcom

WEBSITE: www.netbro.com.au
www.warcom.com.au

PHONE: Netbro (02) 9212 2838 / Warcom (03) 9308 2780
 PRICE: \$369

This antennafied object is one gob-smacker of an ADSL router, full of extras. It's not only a four-port 100Mb/s Ethernet switch, it also sports a configurable firewall (www.speedguide.net/faq_in_q.php?qid=73), an 802.11b wireless interface, supports real VPN, dynamic DNS client and NAT. If you're looking for one of the most configurable wireless ADSL routers, this will tickle all of your packet fancies.



6 MAMBO X 128MB USB MUSIC DRIVE

SUPPLIER: Logix Innovations

WEBSITE: www.logixgroup.com

PHONE: (02) 9742 1900 PRICE: \$249

Behold the ultimate no-frills 128MB 'MP3 singing diskette'. It's almost identical to the Apacer Audio Steno in *Atomic 27*, but with a price drop and slight change in chassis design.

No new whiz-bang features here, just a solid music player with a mic. Like all USB keys, simply jack into a port and tune away. It's lightweight, has an easy interface and is cheap, the only downfall being the horrific earphones. Upgrade those and it's a bargain.



7 JNC 55F-302 256MB DIGITAL AUDIO PLAYER

SUPPLIER: JNC Digital

WEBSITE: www.jnc-digital.com.au

PHONE: (02) 9264 8677 PRICE: \$449

It's not an MP3 player, it's a digital audio player to you, mister. This cylindrical entity supports WAV, MP3 and WMA formats. Sporting an in-built FM radio tuner, a seven-colour backlit display, a pair of quality Sennheiser earphones and a wholesome 256MB of legroom, this is one feature-packed player.

Considering the cost of comparable SD memory, it is very well priced for a player its size. Just don't wear skin tight pants. . .



8 FULL CASE WRAP

SUPPLIER: PC Case Gear

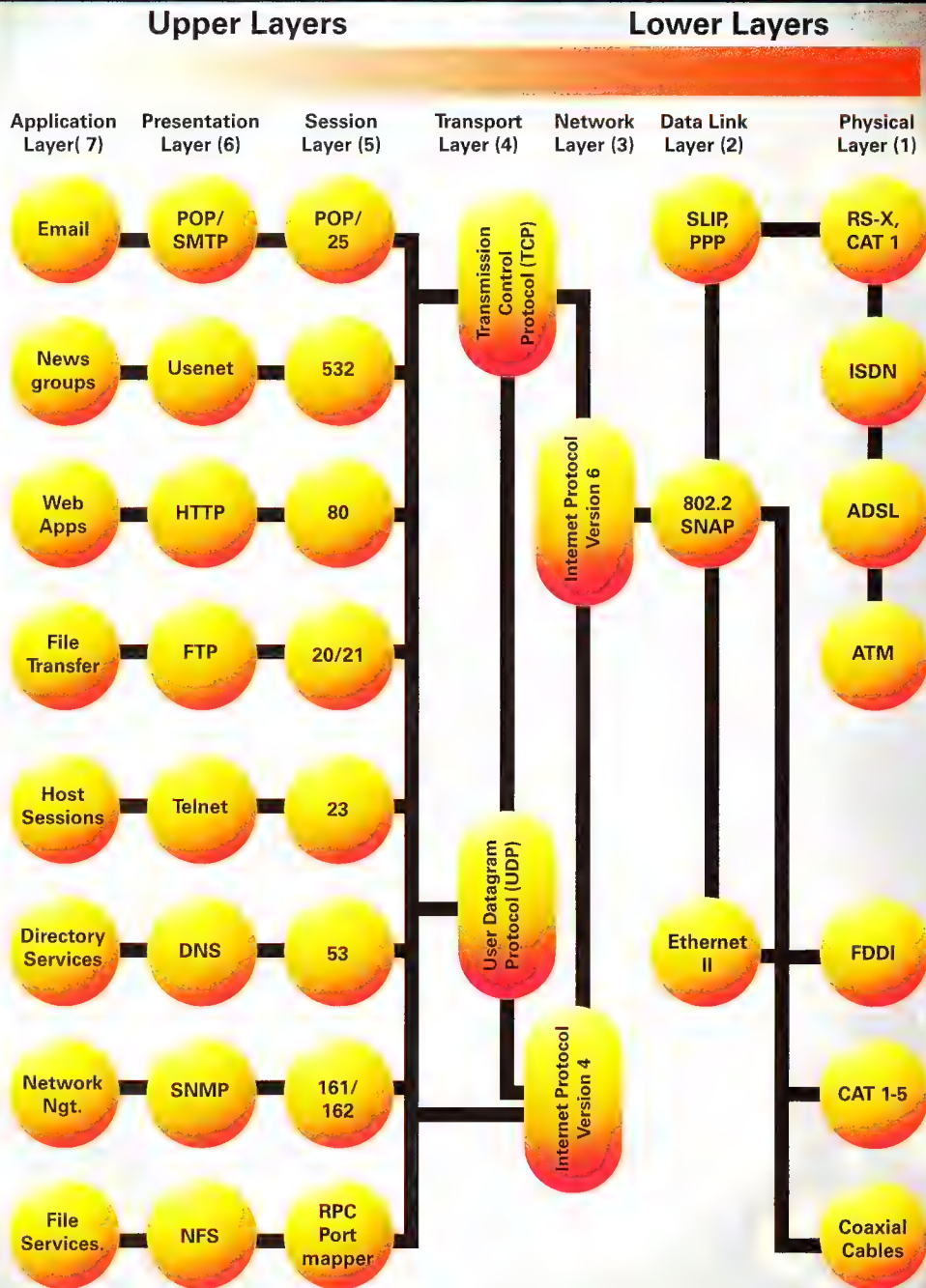
WEBSITE: www.pccasegear.com.au

PHONE: (03) 9568 0932

PRICE: \$119.50 (\$65 for panel wraps)

If you feel that case painting is mediocre – oh, the shame – welcome to the next beautification craze – case wallpaper. (The 50s are back, baby!) Measuring in at 49.5 x 127cm this slick full-case laminated vinyl sticker is available in eight beautiful designs (also available as smaller panel wraps). No teeth crushingly irksome wait for that darned paint to dry, just whack this on and you're done. Wonderful stickerage for all!





ABOVE: A basic breakdown of the seven layers of the OSI architecture. To the left are the 'upper layers'; those closest to and including the Application layer. Protocols on these layers are more interested in compiling information on the data to be sent, rather than insuring it gets over the medium. As you move 'down', or right, though, fragmentation begins and the protection of data becomes more relevant. This diagram also helps to show where the protocols in the TCP/IP suite lie, and what they are responsible for.



Can you remember the first time you used the Internet? Probably not; and unlike 'morning glory', you didn't just wake up with it there. Logan Booker looks at the languages spoken by today's global networks, and why they're still using them.

Like most basic computing technologies, the mystical stuff behind networks and the Internet are, by IT standards, dinosaurs. Lethargic, creaky beasts designed to be reliable – not fast. The only reason they still roam the Earth today is because of widespread and deeply-nested usage, and for the fact that they just *work*. We're afraid to replace them, and eventually, we'll need to. How much longer can this situation exist until the meteor storm strikes and blacks out our online sun? More importantly, why have they lasted so long?

The idea for the 'Internet' can be traced back to the 1960s, when J C R Licklider was throwing around the idea of a 'galactic network'. However, it wasn't until the US Department of Defense (DoD) decided it needed to link its research departments together that things took shape. A reliable and robust system was required that could transmit data in case communications equipment was damaged. TCP/IP was born, after a small stint of NCP (Network Control Protocol), which couldn't handle the expanding workload, along with ARPANET (Advanced Research Projects Agency) – the baby 'Internet'.

PROTOTYPE

TCP/IP – while many computer-savvy people will be familiar with the term, most won't understand how it fundamentally operates. Let's start with a comparison. While 'newer' suites such as IPX/SPX are based on the International Standards Organisation's seven-layer (Application, Presentation, Session, Transport, Network, Data Link, and Physical) Open Systems Interconnection model for network software development, TCP/IP uses the DoD's four-layer (Application, Transport, Network, and Link) model, also known as the DARPA model. This four-layer model translates easily to the OSI model – TCP/IP's Application layer covers OSI's Application, Presentation and Session layers; Transport and Network cover their respective layers, and Link takes care of the Data Link and Physical layers.

OSI is a loose (not officially required to follow) model designed so manufacturers could develop intercommunicative applications without having the concern of how they would talk to the layers above and below them, collectively referred to as the 'stack'. The point of OSI was to make networking transparent, depending on the application or protocol you were programming.

STACKS ON

Before we get our hands really dirty, it's good to know the differences between and the functions of the different OSI layers. From the top layer:

Application: The program-friendly layer that gets everything rolling. Protocols in the Application layer are responsible for handling raw data from user programs and handing it down to the lower layers. It also designates what protocols will be used to handle

particular data in the lower layers.

Presentation: When data is passed to this layer it's prepared for presentation to the Application layer, so it can be understood by the higher-level protocols.

Session: This layer is responsible for creating and maintaining connections between systems. It also looks after connections between applications.

Transport: Perhaps one of the most important layers, as protocols here need to make up for the unreliability of lower layers. The rules for the acknowledgement of data, confirmation of connections and packet sequencing are dealt with by protocols on this layer.

Network: It's between this layer and the Physical layer that things can go awry (lost and dropped packets). The Network layer is responsible for the organisation of data into packets and the transmitting of this data to other networks. The protocols on this layer control the transit of packets between hosts.

Data Link: This is an error-free link between the Network and Physical layers that organises data in preparation for the transport medium. This is where the last major encapsulation takes place.

Physical: The last layer of the ISO model, the protocols here break the packet data up so it can be transported, bit by bit, over the physical connection, be that twisted-pair, copper wire or wireless. Once the target host receives the data, it works its way up from here to be reconstructed and finally presented on the Application layer.

As you can see, there will be many protocols at work to take data from an application and prepare it for transportation over a link. The process of 'wrapping' data up as it passes from layer to layer is called 'encapsulation'. For this reason, TCP/IP and IPX/SPX are not 'singular'; they consist of many different protocols that work on a variety of layers of the OSI model. For example, the TCP part of TCP/IP works on the Session and Transport layers, while the IPX part of IPX/SPX works on the Network layer.

PRE-PACKAGING

Encapsulation is an integral part of the layer-layer relationship. It involves taking data from the layer above and applying a header (and in some cases, a trailer) to that data. Imagine a scrap of paper with a message written on it. Now, take that message and place it into an envelope with the address of the recipient and sender. Place this envelope into another envelope; however, this has a more complex address, and so on and so on. This is encapsulation. For TCP/IP, you could imagine the house number as the port, the street as the target address, and the city as the remote network. Depending on the layer, these envelopes, or packets, can be called 'cells' or 'frames'.

While header (and trailer) contents vary, many contain specific information for their layer as well as a

source and target address (an IP address for the Transport and Network layers, MAC address for the Data Link layer) and checksum or CRC (Cyclic Redundancy Check) to verify data. With some protocols, the checksum is used to check the header isn't corrupt, but with others, such as TCP, the checksum is used to make sure the header and data is okay.

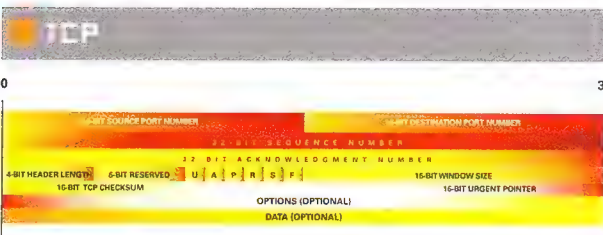
TCP/IP

TCP/IP has its hands in every layer down to Physical (simply called 'Link' in the DARPA four-layer model). As mentioned before, TCP/IP is a suite of protocols – it has something for everything, from FTP (File Transfer Protocol) and Telnet in the Application layer,

TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) in the Transport layer, IP (Internet Protocol) in the Network layer, and PPP (Point to Point Protocol) in the Data Link layer.

One of its advantages is its ability to recover from errors in communication. While this robustness was originally implemented to insure information was received during wartime, it also allowed for data transfer over inherently unreliable mediums, such as copper phone.

TCP/IP is also transparent to the Data Link and Physical layers, meaning it can be easily implemented whether you're communicating through tin cans or whale calls; it doesn't care, as long as it gets the packets it's responsible for.



ABOVE: It's easy to see why TCP is inefficient – it's packed with redundancy. But until we have 100% reliable mediums, it'll be the Transport protocol of choice.

The TCP protocol ensures the integrity of data it sends to higher layers. Using a variety of methods, TCP makes sure all the data received is correct – and this doesn't just mean uncorrupted.

When you send data, say with FTP, to a remote site, that data more often will be greater than 65,535 bytes in size. This is the maximum size of a TCP packet and most hosts, for the purposes of optimal network efficiency, are configured to take packets of about 1,500 bytes maximum, and 576 minimum.

This means a packet between these sizes will likely be left alone by lower layers; that is, it won't be segmented for transport over the medium.

Without fragmentation, sending a file of any reasonable size would be like mailing a whole table through the mail. The logical solution would be to pull the table apart and send it in pieces, for rebuilding at the other end. So, the solution is to break a file into small chunks the network can digest.

Unlike IPX (which relies on higher-layer protocols) or

UDP (TCP's slimmer 'sister' protocol) TCP can receive packets out of order. Within the TCP header (shown in the diagram above) you'll see the 32-bit sequence number, the 32-bit acknowledgement number, the 16-bit window size and a 16-bit checksum.

The sequence number tells the target host where the packet belongs in regards to the whole transmission. The acknowledgement number contains the segment number for the next packet, while the window size sets the size of each packet, and the checksum to make sure the packet isn't corrupt.

If the packets are received out of order, or a packet is corrupt, TCP can set certain flags – U, A, P, R, S and F (as shown in the diagram) – to get the source machine to resend a packet.

Most packets have the 'A' (ACK) flag set, which is the default setting and tells the target machine that another packet is on its way.

These days however, most programs use the 'P' (PUSH) flag to give the packet top priority – meaning it will be processed before other received packets, and consequently causes network congestion if every application sets this flag.

When communication is over, the source will send a packet with the 'F' (FIN) flag, and communication for that set of packets will end. If the source continues to send, for whatever reason, the target host can set the 'R' (RESET) to abort the connection.

This spam mentality may not very efficient, but it guarantees the data will get through eventually. To allow for sequencing and error correction, most TCP headers are 20 bytes in size.



ABOVE: UDP is the most widely used Transport protocol for gaming. TCP is too fat (especially for FPSes), and most gamers don't mind the odd dropped packet.

Compared to the chunkiness of TCP, UDP is a lightweight Transport-layer protocol. The major difference between the two is that UDP is an 'unreliable' protocol – it provides no assurances that a packet will reach its final destination.

While it does contain a checksum to make sure the data isn't corrupt, packets can arrive out of sequence or not at all. Therefore it's not that good for data that needs to remain 100% error-free and has to arrive at its destination.

UDP however is perfect for small, non-critical bursts of data such as online games and sending control messages. UDP is also a 'connectionless' protocol. While TCP performs a handshake to make sure the target host can properly interpret packets, UDP simply sends packets as long as it has a target port and IP address. As there's no need for extraneous data to prevent packets from going awry, UDP headers are around eight bytes long.



AMAZING BROADBAND

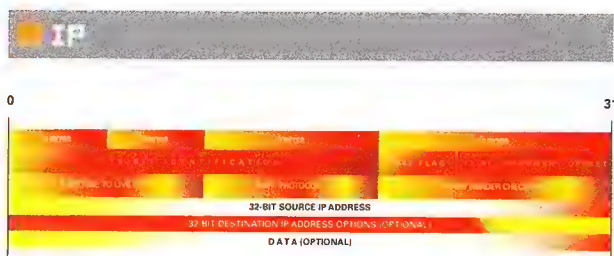
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ABOVE: Don't cringe – there may be a lot of extra baggage, but IP and TCP make sure that your 350MB download is identical to that on the source host.

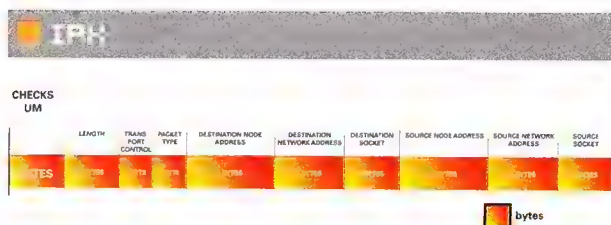
The Internet Protocol works in conjunction with higher-layer protocols (in most cases this will be TCP) to deliver data packets to other machines. It resides on the Network layer and provides a connectionless and unreliable service, leaving all the work of restructuring data packets to the likes of TCP.

One of the terrific things about TCP/IP is its ability to get packets to a target host via any means, including alternate, slower routes. This capability comes from the TCP and IP relationship, which also allows packets to arrive at their destination out of their original sequence. IP uses ICMP (Internet Control Message Protocol) to send error messages when a packet fails its checksum or a target host is unreachable. IP relies on ICMP to manage the flow of data – it's also the protocol used with the 'ping' utility (which sends an ICMP Echo).

Unlike TCP and UDP checksums, IP's is 'header-only'. IP also requires information regarding the higher-layer protocol that it is providing services – this is stored in the 8-bit protocol section of the header. The 8-bit Time To Live variable is also important, as it specifies the maximum number of routers that can process the packet. Once this value is reached, the packet's dropped.

Currently, the most widespread version of IP is v4 (IPv4). Although IPv6 was specified way back in 1995, it has yet to take up mass acceptance – even though it's completely backward compatible with IPv4.

IP headers are chunky like TCP headers, and are around 20 bytes longer.



ABOVE: When there's Novell hardware involved, you'll need to bind this to your network adaptor. . . or if you want to play a bit of Starcraft (pre-patched).

IPX (Internetwork Packet Exchange) and UDP are datagram protocols. This means each packet is self-contained and doesn't require a connection or a previous exchange of information to function. While UDP is part of the TCP/IP protocol suite, IPX is part of Novell's IPX/SPX suite, and resides on the Network layer. IPX requires the layers above it to deal with corrupt or dropped packets, much like IP. IPX does have

a checksum field in its header, however, this is always set to FF (null variable) as error checking is usually performed by lower layers. IPX headers are fat, and are around 30 bytes long. These days, IPX is only used on local area networks.



ABOVE: IPX's best friend. Without the aid of SPX's reliability, IPX wouldn't get your data past your network card. That's if the 42-byte SPX header will fit. . .

SPX sits on the Transport layer and is a connection-based reliable protocol. It supports packet sequencing, and an SPX header is almost identical to that of an IPX header except for 12 additional bytes to provide space for its acknowledgement functions. Where TCP has several flags to control data flow, SPX has the single byte, which is set to 'End of Message', 'Attention', 'Acknowledgement Required' or 'System Packet'. Using this byte, the source host can tell the target host whether to expect more packets, which packets are system (control) packets, or to end the connection. SPX requires packets be sent in order, and so is not as robust as TCP. Also, IPX and SPX packets can only be routed 15 times – too low a number for the Internet. Hence, the IPX/SPX protocol was primarily designed for large LAN environments where the chances of data ending up on an unreliable medium were rare. Where Novell network hardware is running, chances are you'll need IPX/SPX installed.

SPX has a huge amount of overhead. Including the extra 12 bytes, each header is 42 bytes long.

There's a large list of protocols responsible for hauling data around the Internet, your home network and multinationals. Different situations call for different protocol suites – despite the chunkiness of IPX/SPX packets, it's more efficient to run over a LAN than TCP/IP. Even better is NetBEUI (NetBIOS Enhanced User Interface), an efficient, non-routable protocol created by IBM that's perfect for quick file sharing. Whatever the need, there's a protocol to use, and until they stop working, we'll be using them for some time to come. ☐

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INAC ATTACK

Inside Apple's IBM-powered G5, and how it compares to P4 and Athlon

Is the G5 a rotten apple? We sent Dr Carlo Kopp to the orchid to find out.

The recent announcement of Apple's PowerMac G5, built around an IBM 970 microprocessor, puts Apple in the spotlight with a product that is highly competitive against the latest Intel and AMD offerings. In this month's feature we will explore the technology behind the G5 and make some comparisons against the Intel architecture.

■ IN THE BEGINNING...

In historical terms, the PowerPC architecture is about half the age of the Intel x86 architecture. The earliest origins of this product line fall into the late 1980s, the era of the Intel 486 and the dominance of Sun Microsystems in the Unix workstation market. This was a period when Intel architecture PC represented well and truly the 'bottom-end' of the market, both in price and performance. A top-end Intel motherboard of that period would boast a 66MHz CPU chip, external cache, several ISA slots, but may have still used an ST-506 disk interface. A 100MB hard disk was worth many hundreds of dollars and the only Unix ports for a PC were the early SCO offering and the Interactive Systems port, later to morph into Solaris 2 for Intel.

The top-end of the desktop market was an ongoing bloodbath between Sun Microsystems, Silicon Graphics Inc, Hewlett Packard, Digital Equipment Corporation (now Compaq)

and IBM. Sun transitioned to their SPARC RISC architecture, abandoning the Motorola 68KB series, HP were developing the HP-PA RISC architecture, DEC were transitioning from the MIPS RISC architecture to the 64-bit RISC Alpha, while SGI drove the MIPS line harder and faster. IBM saw a major opportunity in the Unix workstation and server market, but had no product which could compete against the 'RISC revolution' sweeping the workstation marketplace. IBM needed a product which could compete in SPECMarks performance against the top-end of technology marketplace, and needed it badly in a world where the large mainframe market had saturated and increasing numbers of users were bailing out to buy larger Unix servers.

Thus was born the IBM POWER architecture. Performance Optimisation With Enhanced RISC - POWER - was the marketing label attached to IBM's then new RISC architecture. RISC architectures - Reduced Instruction Set Code - were a Berkeley idea from the early nineties intended to solve many of the performance and architectural problems of the then incumbent CISC - Complex Instruction Set Code - architectures of which the Intel x86 was a typical example. The typical CISC architecture of the era had a small number of registers, usually over two hundred instruction types, and used a microcoded control unit to drive the inner workings of the processor. Machine architects of the period observed that

there were often never enough registers to go around, only 20% to 30% of the instruction types were being used by compilers, and the microcode in the CPU control units was an incessant source of pain. Why not make architectures with lots of registers, a small number of simple but fast instructions, and architect a simple hardwired control unit which can execute an instruction in one or two clock cycles rather than 6 or 10 as incumbent microcoded systems did? The RISC architectures emerging during this period observed the RISC religion with varying degrees of conformity.

IBM's first generation of 32-bit POWER Architecture chipsets started shipping in RISC System / 6000 or RS/6000 workstations during 1990 – the marketing label 'RS' being the source of much mirth in the Australian market. This author had the pleasure of evaluating one in 1992, including a complete stripdown to board level, a rare treat for a SPARC designer of the period. IBM's RS/6000 was blitzing the SPECmarks and we all wanted to know how they did it. What IBM had done was throw out the period convention of a RISC CPU on two or three chips, and an A4-sized or smaller motherboard. The first generation POWER chipset used either seven or nine chips in large chip carriers – the 'CPU complex' itself occupying as much area as a whole SPARCStation 1 or 2 motherboard, and the motherboard itself double the size of its rivals. As a designer what impressed me most about the early RS/6000 was its production engineering – the chassis and system level hardware was carefully engineered for lowest cost mass production, yet the CPU chipset was the most powerful and physically largest in the market made with the most expensive processes of the day. The floating power hardware in the chipset was intimidating to competing vendors.

IBM were anything but religious in their interpretation of 'RISC' and used around 100 instruction types in the architecture, including many powerful floating point instructions. Using a mix of hardwired and microcoded control, the POWER architecture stretched the RISC definition to the limit.

The success of the POWER architecture in the RS/6000 was in the benchmark wars – marketing to customers was another issue in a deeply parochial market which saw little attraction in IBM's home grown AIX 'UNIX-like' operating system – did not go unnoticed. Motorola were smarting from Sun's decision to bail out from the 68KB series, and their new 88,000 series RISC engine was not proving to be a hot seller. Apple, until then wedded like Sun to the 68KB, saw a future world dominated by proprietary and often inaccessible RISC architectures. Like IBM they needed a technology to compete with, and this led them to partner with IBM to develop the PowerPC RISC architecture.

The PowerPC architecture was a derivative of the IBM POWER architecture, but optimised for single chip, superscalar, multiprocessing and 64-bit implementations and making use of Motorola's experience in 88,000 series RISC processor bus. The first production PowerPC chip, the 601 used in entry level NuBus and PCI PowerMacs, excluded a number of IBM POWER instructions such as three integer rotate-insert, Load String and Compare Byte. The revised memory architecture saw the demise of a number of IBM POWER features. In summary, the PowerPC was a simplified and streamlined evolution of IBM's original architectural definition, accommodating a 64-bit model from the outset.

IBM developed their POWER series through the POWER2 (1993 – 1998), the 64-bit POWER3 (1998 on) and dual CPU POWER4 dies, focusing on their core business of 'UNIX-y' AIX workstations and servers. Apple and Motorola pursued the 'lower-end' of this architectural domain with PowerPC single chip implementations, with Apple populating their PowerMac

motherboards and Motorola developing a thriving VME-bus product line for embedded applications.

The first generation of NuBus based PowerMacs with PPC 601 CPUs hit the market in 1994, and were superseded in 1995 by second generation PCI motherboards using the PPC 601, 603e, 604 and 604e CPUs – these remained in production until 1997.

The first of the third generation motherboards emerged in 1997, using a PPC 750 chip, but was soon superseded by AGP/PCI capable motherboards with the PPC 7400 (350 to 500MHz / 10.5 million transistors) and later PPC 7450/7455 chips. These were known by the marketing name of 'G3' and 'G4' – the G4 including Motorola's 'AltiVec' SIMD hardware labelled the 'VelocityEngine' by Apple and loudly advertised as a 'Cray on a Chip'. While the AltiVec is a very nice short vector processing engine, one has got to wonder about the marketers who opted to compare a 16/8/4-deep vector engine with a 64-deep Cray!

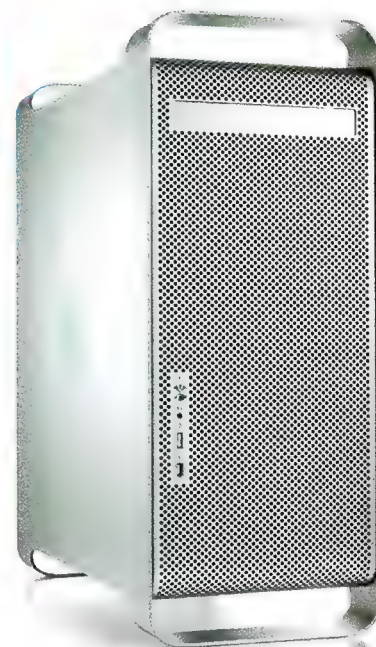
The new IBM 970 chip has its roots in the IBM side of the POWER/PowerPC family, and presents an interesting transition in Apple's technology base – the G4 series chips were essentially G3 cores with the AltiVec SIMD engine attached and were never competitive in the 'clock speed wars' with Intel and AMD.

Based on a superscalar RISC architecture the PowerPC had highly competitive performance during its early life against the Pentium I/II/III, but this collapsed as Intel and AMD aggressively pushed into copper metallisation and the Pentium 4 and Athlon microarchitectures.

THE IBM POWERPC 970 ARCHITECTURE

The immediate origins of the 970 lie in the 64-bit dual CPU IBM POWER4 series core, developed for high-end server applications. The design aims of the 970 were to produce a high performance single CPU PowerPC incorporating the 64-bit architecture of the POWER4 and an enhanced variant of the AltiVec SIMD engine used in the G4 series, with a fast processor bus capable of coping with an instruction-hungry 1GHz+ CPU core and data-hungry AltiVec SIMD engine. Early 970s announced in 2002 were to run at speeds of 1.4 to 1.8GHz – slightly behind the Intel/AMD offerings in raw clock frequency but using a more efficient architecture.

The POWER4 core which is the basis of the 970 is an eight-way superscalar processor with speculative execution, supporting out-of-order execution and capable of eight instruction issues per clock cycle. This compares very closely



↑ **ABOVE:** The G5. It almost looks like something you'd find at a LAN. Except for the Apple on the side.

to the nine-way superscalar core in the 32-bit Athlon. Unlike the Intel architectures, the PowerPC/970 has no less than 32 user-accessible general purpose integer registers, 32 floating point registers, and five user accessible special purpose registers.

Of the eight execution units in the core, two are paired floating point units, designed for fused multiply/add operations, two are integer units, two load/store units for address arithmetic, one is dedicated to branch prediction, and one is dedicated to condition register operations.

The pipeline arrangement in the 970 core is quite complex. There are nine stages used for instruction fetching and decoding, capable of fetching up to eight instructions per cycle. Instruction dispatch is performed in one to two pipeline stages, capable of dispatching up to five instructions per cycle. In the 970 core, there are 12 execution units in total, four associated with the AltiVec/SIMD instructions and eight adopted from the POWER4 core. A single pipeline stage is used for completion, capable of handling five completions per cycle.

Unlike the Intel/AMD cores where significant decode logic is required to handle the large instruction set, the PPC core with a smaller RISC instruction set can get by with less effort in mapping the instruction set to internal operations – an area where RISC has held an advantage over CISC cores.

The branch prediction hardware is capable of handling two branches per cycle. When instructions are fetched, up to eight per cycle, the branch prediction logic scans these to find conditional branches. Depending on the branch type, different handling mechanisms are applied. If a branch prediction has failed, the correct instruction stream is refetched.

'Given the enormous performance penalties suffered in any deep pipeline if a branch prediction fails, good branch prediction hardware can be a tremendous performance enhancer.'

IBM has been quite elaborate in its dynamic branch prediction hardware. No less than three branch history tables are embedded in the core. A 16KB 'local predictor' table will be indexed by the branch instruction address to yield a one-bit branch 'predictor' – this tells the core to either take or not take the branch. A second 16KB 'global predictor' table is used to predict a branch direction based on the path of the code execution. A third 16KB 'selector' table is used to keep track of whether the local or global branch predictions are working better, and is used to choose which of the two branch predictions is to be used. IBM claims this arrangement has proven to be very accurate in predicting branches across a wide range of very different application types. Given the enormous performance penalties suffered in any deep pipeline if a branch prediction fails, good branch prediction hardware can be a tremendous performance enhancer. A facility with reserved bits is available to permit software branch prediction if required.

The 970 is a true 64-bit architecture, capable of running in a native 64-bit mode and a native 32-bit mode, for compatibility with older applications. The adoption of a 64-bit



↑ ABOVE: Not to scale – they're superscalar, see?

architecture was driven primarily by commercial server applications, many of which can involve very large address spaces, however the emergence of a 64-bit PowerPC in the desktop market will have interesting effects for top-end apps.

In native 64-bit mode, the 970 supports 64-bit wide integer operations, 64-bit virtual addresses ('Effective Addresses' in IBM-speak) and 42-bit physical addresses ('Real Addresses' in IBM-speak). A Segment Look-aside Buffer (SLB), directly analogous to the TLBs used in Intel architectures with paged virtual memory, is used to cache segment table entries. The SLB is a 128-entry two-way set associative arrangement.

In native 32-bit, the high word in all virtual addresses is cleared, and the first 16 entries in the SLB are used as segment registers. The intention was to directly support existing 32-bit code.

While the 970 uses what is essentially a single POWER4 core, reimplemented for higher clock speeds, its inclusion of the 'SIMD/Vector Engine' or AltiVec reimplement is new. The Motorola AltiVec is widely considered to be one of the better SIMD engines in the market, although like all SIMD engines its usefulness is highly dependent on the applications being run on the machine.

The 970 SIMD hardware supports 162 SIMD instructions and is built with 128-bit wide datapaths. The hardware supports four-way SIMD operations on single precision floating point operands – clearly a design optimisation for graphics and signal processing. The hardware also supports four-way, eight-way and 16-way SIMD operations on integer operands.

The cache and bus arrangements on a core which will be as demanding in memory bandwidth as the 970 are always challenging. As we have seen in recent Intel cores, considerable die real-estate has been committed to cache hardware.

The 970 uses a two-level cache scheme, with a Harvard-style split architecture for the L1 cache. While current disclosures on the cache have been limited, if the POWER4 cache has been lifted directly then the 64KB L1 I-cache used for instructions will be a directly mapped scheme with 128-byte wide lines, permitting the eight-instruction wide fetches described in the fetch/decode hardware. The 32KB L1 D-cache used for data would be a two-way set associative scheme. IBM's disclosed that both caches are parity protected.

Where the 970 departs dramatically from the POWER4 is in the L2/L3 cache area – not surprising as the POWER4 is designed for 'heavy iron' multiuser server applications. The POWER4 uses up to 1.5MB of eight-way set associative L2 cache on top of up to 32MB of eight-way set associative L3 cache – while the 970 is intended to use only 512KB of ECC protected L2 cache. It is a reasonable bet that the L2 will use the same eight-way set associative 128-byte line arrangement as the POWER4 does making it directly competitive against recent Intel architecture offerings. The cache bus in the POWER4 permits either a 256-bit wide read or write operation per cycle – which again is directly competitive.

The processor bus, labelled 'HyperTransport' by the marketers, is evidently a derivative of the POWER4 multiprocessor switch fabric as it is a split 32-bit wide point-to-point arrangement, with timing slaved to the bus operation source, and support for cache snooping, another POWER4 feature. IBM are claiming a 900MHz bus bitrate and up to 6.4GB/s burst rates. Apple marketing literature puts the bus

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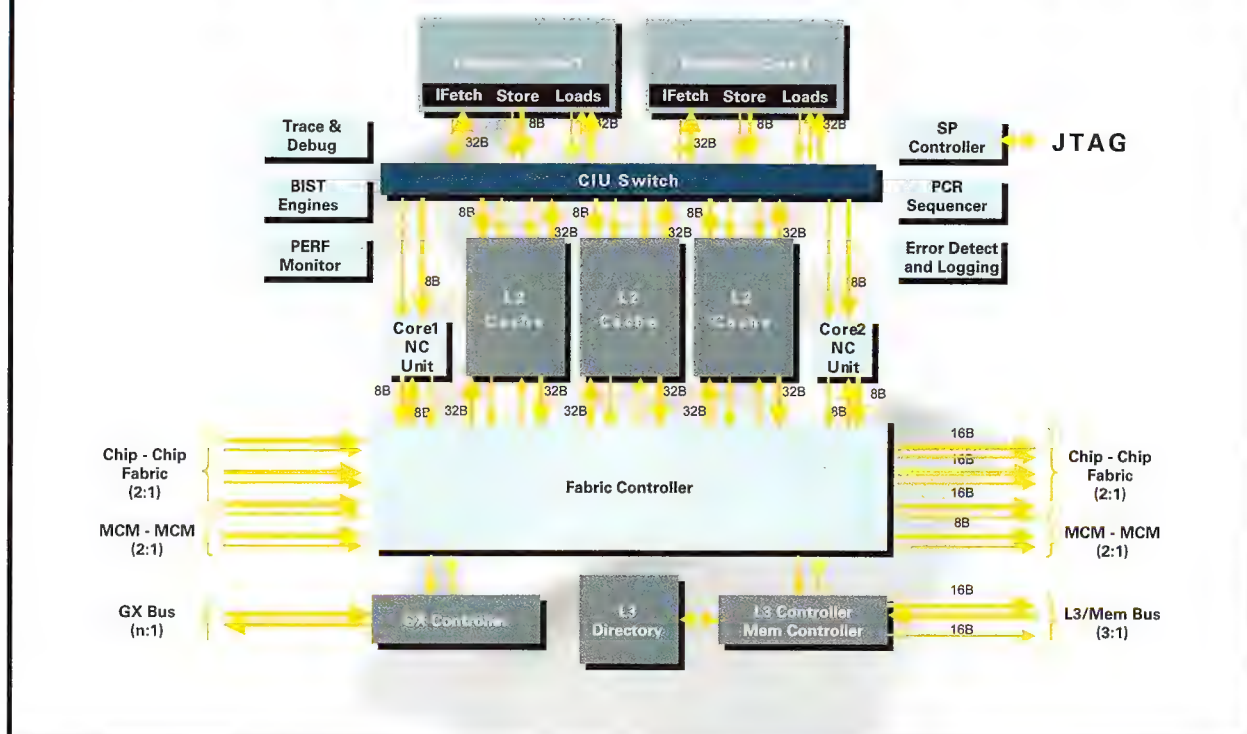


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SimCity 4 images courtesy of Electronic Arts



POWER4 PROCESSOR SCHEMATIC



speed at 800 to 1,000MHz, although some of their claims about the achievable performance in accessing 333MHz PC2700 and 400MHz PC3200 DDR RAM in the PowerMac G5 system seem a little dubious.

Initial systems will be supplied with 1.6, 1.8 and 2.0GHz CPUs, 3.0GHz CPUs are expected next year. The 1.6GHz systems are loaded with 256MB and 1.8/2.0GHz systems loaded with 512MB. Initial models will be loaded with NVIDIA GeForce FX5200, ATI RADEON 9600 PRO and optionally ATI RADEON 9800 PRO graphics controllers.

The I/O and storage on the initial G5 motherboards is to include 80/160 Serial ATA with 7,200rpm drives, three 64-bit PCI slots with bus clocks ranging from 33MHz to 133MHz, depending on the motherboard subtype, three IEEE 1394 FireWire ports, two at 400MHz and one at 800MHz, three USB 2.0 ports, one 10/100/1,000-BaseT Ethernet port, and provisions for an AirPort Extreme wireless adaptor.

The standard operating system is MacOS 10.2 – Apple's fusion of the Mach kernel and FreeBSD upper layers with Apple's proprietary display and graphics environment.

The G5 will be highly competitive against top-end Intel and AMD offerings – with the caveat that specific applications may be optimised for specific CPUs in ways that may not entirely agree with others.

■ SIZING UP THE G5/970

When assessing a 2.0GHz G5 against a P4 or Athlon platform several key issues arise:

- The 970 is a RISC core, which is quite different to Intel and AMD cores, even if it has a similar number of execution units.
- The 970 has an exceptionally good bussing and cache architecture, derived from top end IBM server technology.

■ Applications which can exploit the Altivec/SIMD engine may deliver unexpectedly good performance, against the older technology Intel and AMD SIMD engines.

■ The 970 is at an earlier point in its life cycle than either the P4 or 32-bit Athlons and we are likely to see further evolution of the chip, even if the basic POWER4 core remains stable in the foreseeable future.

■ The BSD/Unix derived MacOS 10 is a vastly more efficient operating system internally compared to the Microsoft offering.

That the 64-bit 970/G5 is closer in concept to the upcoming 64-bit Athlon derivatives should not have a dramatic impact on the typical user – 64-bit technology has historically been a favourite in the commercial database market and even there did not provide enough of a competitive advantage to save DEC, first in the market, from its eventual demise.

Published SPEC2000 integer and floating point benchmark figures put the 1.8GHz 970 at 937 (int) and 1051 (fp) respectively, which is very close to published figures for 2.8GHz P4 and 2.25GHz Athlon XP systems. Readers should not be surprised at the disparity in clock speeds and SPEC results – the 970/G5 is a RISC core with a very fast cache and memory architecture, running a more efficient OS.

The Apple G5 systems are using first generation 970 motherboards which leaves considerable scope for further performance growth. It is reasonable to expect that future dies may have much larger L2 caches, and possibly refinements in the Altivec/SIMD engine. US sources suggest that IBM's POWER5 die will become the basis of the upcoming 980.

What is clear is that after several years of languishing with the G4, Apple are back in the game with a competitive family of processors and motherboards to match.



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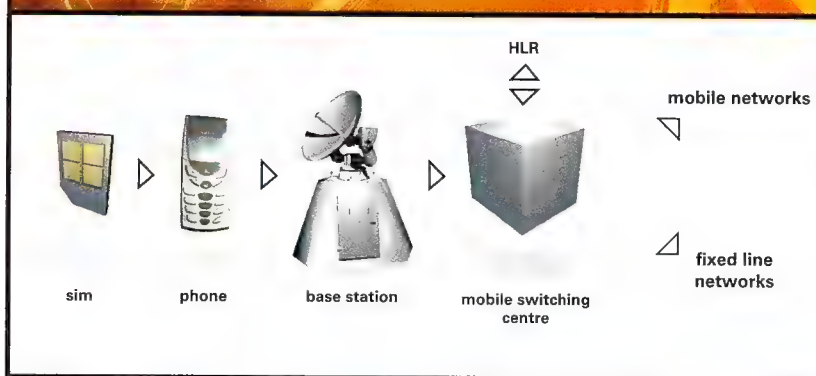
»»» The world in your pants

Until now John Gillooly thought 3G was some sort of rap artist.



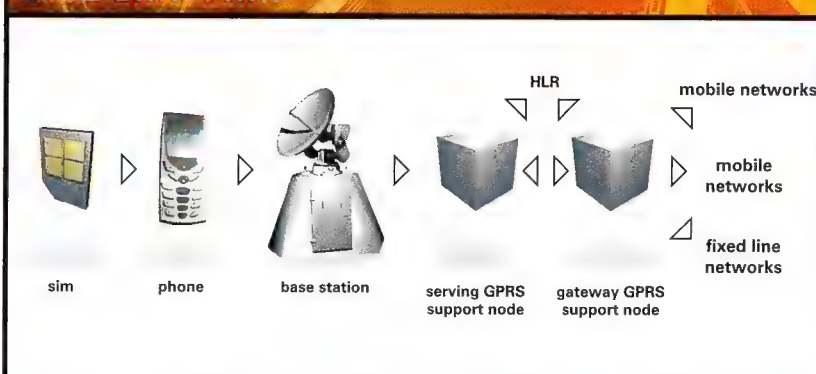
All the tech companies are talking convergence. The buzz of the 21st century is putting everything in the one device. We are seeing it with the advent of the media centre concept with PCs, with the rise of the iPod-style portable hard drive MP3 players, but nowhere is this trend happening quicker than in the realm of the mobile phone.

GSM DATA PATH



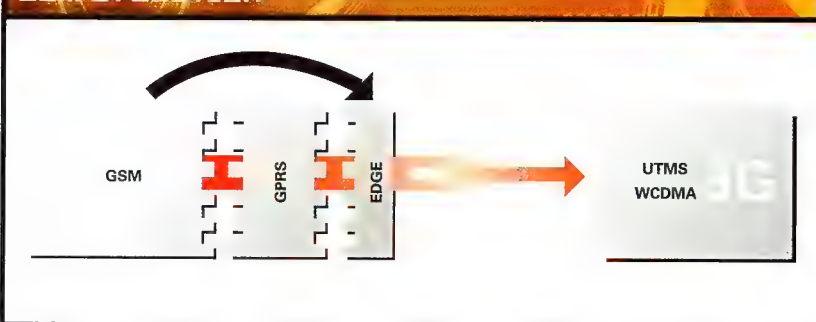
ABOVE: Using data on the SIM card a phone talks to the base station and verifies with the HLR (Home Location Register), which keeps billing information, before the call is connected.

GPRS DATA PATH



ABOVE: GPRS introduces two new segments to the mobile switching centre, the SGSN and GGSN, which control the flow of packets to and from the phone, while talking to the HLR.

GSM EVOLUTION



ABOVE: GPRS and GSM are both enhancements to existing GSM technology. A hardware upgrade will be required to make the move to WCDMA 3G functionality.

Talk to the people in the know and you'll find they don't call handsets mobile phones, or even handsets for that matter. They're called terminals, portable access points to global data networks.

It is a trend following the exponential technology curve that has us so excited about new generations of products every six months, and now that persistent issues like international standardisation are finally being dealt with, mobile phones are becoming damn cool pioneers of computing technology.

For all of the immense wank factor

associated with the marketing of next generation mobiles, there is some stunning technology being produced and rapid shifts of traditional marketplaces. Nokia currently makes two out of every five mobile phones sold worldwide, but more interestingly it recently became the largest supplier of digital cameras.

Phone cameras have a long way to come before they destroy the markets of Kodak and the like, but it will undoubtedly happen. Traditional camera manufacturers are so worried that they are beginning to form partnerships with

phone manufacturers. Otherwise the money making part of the market they have so carefully nurtured, the average consumers, could be lost to Nokia, Sony-Ericsson and Samsung.

But cameras are a tiny part of the picture, being hyped as the bait to get people upgrading their terminals. What is really cool receives much less attention, the background goings-on that make it easy to stream live footage of your butt to random strangers.

Tackling the issue of next generation mobile phones is like trying to eat a phenomenally large hamburger; most time is spent rotating the thing trying to work out where to make the first incision. It is a big bundle of interrelated technologies, with major action happening with the networks, terminal hardware and software.

EUROPE FINALLY GETS IT RIGHT

Australians are pretty lucky when it comes to mobile telephony. For some reason – that few people can agree on – we have leapt onto the concept with gay abandon. Not only do we tether ourselves to constant voice communication, we use SMS like few other countries have so far. We are comfortable with the concept and have benefited from being seen as a major market for the big players like Nokia. This is perhaps a side effect of the fact that the United States is a mess when it comes to networks. There's a ridiculous number of competing standards, and historically poor support for the one standard that has revolutionised mobile telephony in Europe and Australia. Its full name is Global System for Mobile Communications (or as the Frenchies call it Groupe Speciale Mobile), but we all know and love it as GSM.

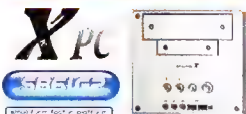
If there is any good entry point to the future of mobile communications it is with GSM. This standard evolved as Europe began looking for a digital phone system as demand began to bite into the existing first generation analog networks. Sensing the need to avoid such future problems with wholesale network replacement, several European countries banded together to form the Group Speciale Mobile. This was endorsed by the European commission in

While everyone is concerned about the effects of EMF on their brains, no one seems worried that eye cancer is also on the rise. In a study in Germany, it was found that heavy cell phone users had 3.3 times the chance of developing Uveal melanoma, a rare eye tumour.

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Integrated Cooling Engine (ICE) technology



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- Overclocking - FSB, Multiplier



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Nokia has made efforts to break through interface limitations with the 6800. The foldable, backlit keyboard is a quick and easy way to SMS, with a short learning curve. With MMS and email now on phones, this type of interface is needed.



Nokia's first consumer-focused camera phone was the 3650. The round number interface is dramatically different to Nokia's normal keypad, but is more suited to this Symbian 6.0 OS-based phone's functionality.

1984 and notably backed by the United Kingdom, West Germany, France and Italy. In 1987 the GSM standard was decided upon, a standard that still forms the basis for the networks we use to today.

And that is the beauty of it. As we move towards the magical 3G technology that has had everyone excited for way too long now, the networks will evolve rather than be subject to wholesale replacement. There are clear paths defined, luckily for us all building upon the solid framework built by GSM.

Ultimately the implementation of 3G will come in the form of the Universal Mobile Telecommunications system (UMTS), which has the noble aim of becoming a worldwide standard for data access and network interoperability. The term is used almost interchangeably with W-CDMA (Wideband Code Division Multiple Access), which is the radio technology underlying 3G.

What is happening in the United

States and Japan is much different, but shooting to a similar endpoint of 3G functionality. Japan already has a well established 3G network run by NTT DoCoMo, with over half a million subscribers, while the yanks have to cope with evolving GSM, CDMA and PCS networks.

RADIO FREE NOW HERE

Once you take away the colour screens and skull-drilling ringtones, the single most important thing to know about a mobile phone or other terminal is that it is a radio transceiver. Not only does the radio mean we need to switch our phones off on planes, without it we would be unable to SMS those delightfully '*' ridden ASCII jokes to our mates.

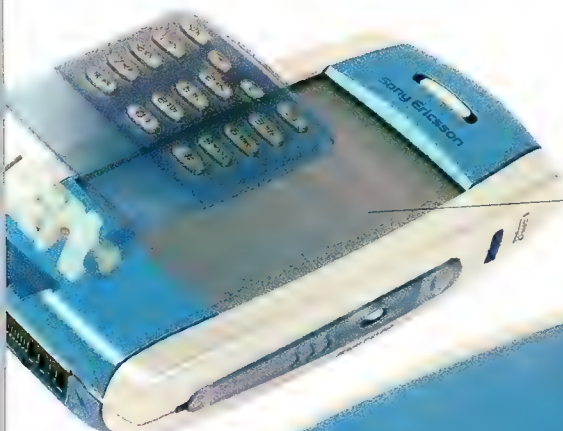
GSM operates on one of three radio frequencies, all heavily regulated unlike the 'free' 2.4GHz band used for Bluetooth and Wi-Fi. Most of the world uses either the 900MHz or 1,800MHz

bands, while yet again those non-conformist North Americans use the 1,900MHz band. UMTS makes use of the 1,885-2,025MHz band.

Within the realm of each telco there will be a certain number of available channels to use, which get split between voice and data channels and segmented across the city in a honeycomb pattern of cells, which are centred on base stations. As your terminal passes from one cell to another it gets handed over to the new base station, switching seamlessly to a new frequency.

As you can see from the diagram, the channels can then be reused in non-adjacent cells to maximise available channels, and the cells themselves are packed densely in urban areas in order to facilitate the cries of a thousand orphaned voices echoing through the CBD at lunchtime without an engaged signal or network busy warning.

This leapfrogging between cells is the fundamental building block of how



The Sony-Ericsson P800 is one of the better examples of a hybrid phone/PDA. Using the Symbian 7.0 OS it can be reconfigured to work as a touch screen only device thanks to the removable flip function.



PDA functions on the P800 are accessed using the stylus, which also supports the new Memory Stick Duo format.



The T310 from Sony-Ericsson is one of the first mid-range colour screen phones with support for downloadable games. The highlight is Tony Hawk Pro Skater 4, which is unfortunately not the most playable example of mobile gaming.



The 3650 is one of Nokia's only GPRS phones capable of sending video, and only of the pre-recorded variety.

PURPLE MONKEY DISHWASHER.

mobile phones communicate, and works in a similar way across all the flavours of networks. Evolving technologies build upon this framework rather than replace it, bringing in new software protocols and ways of splitting frequencies to maximise bandwidth for the potential explosion in mobile data access.

PACKETS FROM ABOVE

In terms of Internet usage, General Packet Radio Service is the mobile equivalent of switching from a dial-up modem to an always-on broadband connection. It is also the first of two steps designed to enhance GSM long enough for the transition to 3G technology. Traditionally the means of connecting to the net for WAP connections has involved dialling in to a server and establishing a connection, then disconnecting when you finish your session. This is called 'circuit-switching'.

Circuit-switching is not dead however; as a new standard called High Speed

Circuit Switched Data (HSCSD) allows for much faster connection speeds than previously available. GPRS is generally the most suitable means of connecting to the internet wirelessly, but HSCSD is perfect for streaming media like video in which a dedicated link is required.

GPRS works at a packet level, directing data to and from a terminal when needed, which is called Packet Switching. Such functionality is incredibly important if truly seamless mobile internet use is to occur as it facilitates everything from email messages arriving at the terminal when they hit the server to more natural mobile usage patterns, like firing up a Web browser to check movie times from the pub down the street. It also frees up network bandwidth by only using the connection when data is being sent or received.

Circuit-switched connection speeds on GSM are partially influenced by network hardware, but generally they operate at 14.4Kb/s, and 38.4Kb/s for HSCSD connections. Packet-switched

GPRS networks run at 115Kb/s and this is set to increase when the next step on the 3G ladder comes along. This is called Enhanced Data GSM Environment (EDGE) and will boost data transfer speeds to 384Kb/s, allowing for decent multimedia content delivery.

EDGE does require an upgrade to the RF transmitter hardware of base stations to increase these speeds, but as a side effect it not only boosts transfer rates for packet-switched data, it also speeds up GSM transmission. But it's also only an optional path for telcos to take, with many opting for a direct move from GPRS to 3G.

3G in the form of UMTS is the real breakthrough technology, being designed from the outset for data, unlike GPRS, which is shoehorned on top of GSM. This allows for transmission speeds of up to two megabits and true global roaming support. Just like the transitioning of regional Australian mobile services from analog to CDMA happened with dual-mode handsets, the

first iterations of UMTS in mobile phones will most likely be alongside support for GSM/GPRS.

NOT A PENGUIN IN SIGHT

You can have all the bandwidth in the world, but without the right hardware it's useless. After all, what's the use of a fat wireless 2Mb pipe if all you can use it for is reading your email? Actual mobile phone hardware varies a hell of a lot, but thanks to some emerging standards the user experience is set to explode in a frenzy of downloadable applications, multimedia and powerful pocket hardware.

The line between PDAs and mobile phones is being blurred, moving far from the early hybrid PDAs with chunky mobile phone add-ons. Not only have

PDA companies like Handspring moved into the mobile phone market with its Treo products, phone companies are making phones that rival PDAs in terms of functionality.

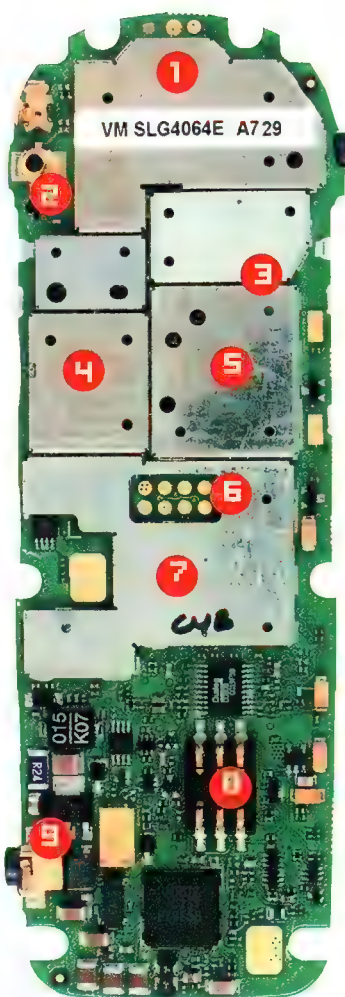
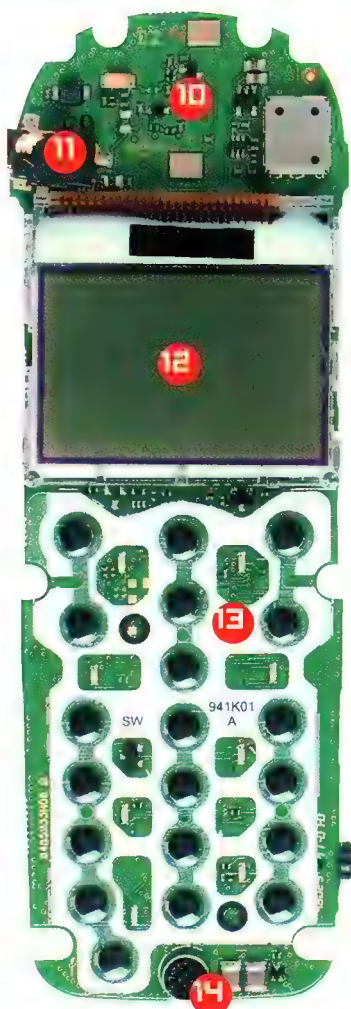
Until last year such devices were rarities from phone companies. Nokia had its communicator line of fold open phones, Motorola had its Accompli phone (you know the one, every trekker out there lusted after its tricorder-ness) and a company called Psion had a range of PDAs designed for use on mobile networks.

Psion is an important factor in 3G, even though it's essentially out of the hardware equation. It's responsible for the initial work done on an operating system called Symbian. In 1998 a bunch of players in the industry spun Symbian off into a company of its own, and it is now owned by Nokia, Psion,

Motorola, Ericsson, Sony-Ericsson, Samsung, Panasonic and Siemens. There are already several Symbian-based phones on the market (the first were Nokia's Communicator models) and this is a trend set to continue.

When we asked Nokia's Local Product Manager Greg Pannikin about the most exciting aspect of mobile phone evolution, Symbian was at the top of his list. Because it is a standardised operating system, and out of the control of any single player in the market, it facilitates a whole new world of phone software development. Applications can now be easily written for a range of phones using Java-layered onto Symbian. There are over 50 new applications released each month for Symbian, and over 700 registered applications have been developed so far. The number of third-party applications is unknown, but

INSIDE A 2G GSM PHONE



- 1 Speaker circuitry
- 2 Connection for aerial
- 3 Clock generator
- 4 Radio transceiver
- 5 Power supply circuitry
- 6 PC interface connection
- 7 CPU
- 8 SIM interface
- 9 Recharger connection and battery circuitry
- 10 Speaker connections
- 11 Hands-free kit plug
- 12 LCD screen
- 13 Keypad contacts
- 14 Microphone



The Greatest Game of All

Fond memories of golden gaming
By Atomicans

 **HEROES** 

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We can be Heroes Just for one game



Like many things in life, games are something we do because we seek a good time. The more play, the better we get. The better we get, the more we need to play. For some, it can be a case of diminishing returns. For others, all gaming is as magic as the last round.

Whatever kind of gamer you are, there's no doubt that you each hold dear the memories of a time, or a moment, or an experience which was somehow the most golden of all your gaming. It probably goes back to the early days of your gaming. It is likely that it had a lot to do with you wanting to play more to relive the magic feeling.

You all have that special memory tucked away. But what's the use of keeping those teary yet joyous memories to yourself – when you can have them printed in *Atomic*? Right on.

A month ago we asked you to tell us of your magic moments. We did that online at www.atomicmpc.com.au and you came forward with sweet sweet gaming magic. We only gave you 100 words, but you used them to great effect. You can sense, when reading the winners here, that the writers were reliving the moment – for their sake, and yours.

When we had the idea to do this we approached Gamenation and asked the people there to make it special by donating prizes suitable for such a competition. These guys have their 'Heroes' range of classic games, so it seemed right and proper that we run with that. A perfect prize for a nice comp.

We had many very impressive entries, and choosing the best was tough. Thanks from me to all the *Atomic* crew, for carefully going through all the entries and choosing the best with me. It was a mostly democratic process, which we love around here.

Enjoy the memories, and dig out your own games and recreate a few of your own!

Ben Mansill

Pong



Good vs Evil, Me vs You, Me vs The World. Hell, it's the classic example of the teenage mindset. Pong, now there's a game. Watching the sides move up and down. Ball; back and forth – a champion's game, that. Ah, like it was yesterday, and it was, too. The game is always good for the reflexes, memory and just plain, old fashioned good fun. As a child you would play, enchanted. As an adult you play, nostalgic and entranced to win. As a matter of fact, I think I'll have a game right now.

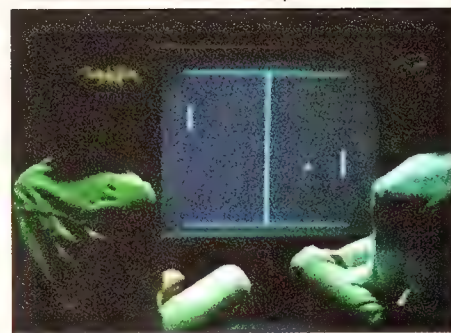
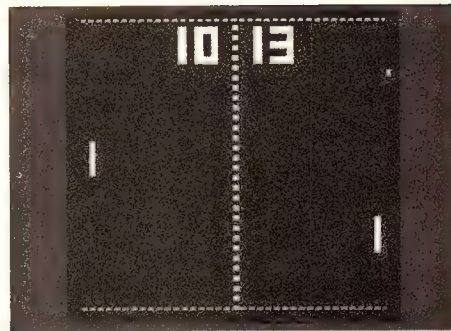
PAUL DONNELLY

PLATFORM



INFO

What's that pong? Why, it's the game of course. Perhaps the best remembered generator of joy ever. Look at those kids, they can barely sit still!



System Shock 2



I was at the end of a 'U' shaped hallway, so I could only see one end. As I peered around it I saw a small movement. I thought to myself, 'nothing', but looked around the side and came face to face with a 'cyborg midwife'. You can imagine the effect, it screamed to high hell. It also made a movement towards me. The weapon of my choice at that time happened to be the assault rifle, unfortunately on auto. Guess what happened. I let loose on full-auto while jumping 10-foot off my chair.

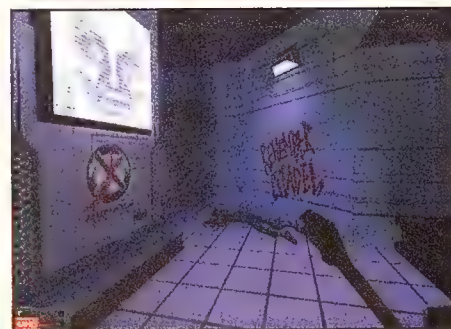
JOHN HUNTER

PLATFORM



INFO

Awesome. Even better with hi-res models. If you're after a mod to make the SS2 experience even more real, head over to http://perso.wanadoo.fr/etienne.aubert/sshock/sshock_rebirth.htm.




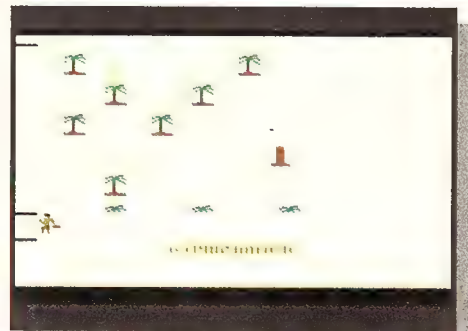
Riddle of the Sphinx



As I delicately pushed the cartridge labeled 'Riddle of the Sphinx' and the joypad into the console without being noticed, my stomach groaned. The risk of being caught was enormous, I wasn't supposed to know about it, let alone use it before Christmas. As the colourful splash screen appeared I sat in awe, the machine seemed to speak to me as I entered the game. The pixellated figure and unrealistic palm trees engulfed the screen, what was supposed to be minutes turned into hours and my mother burst through the door in fury. I never saw the Atari 2600 again.



PLATFORM	INFO
	Old games have a certain charm. Heck, seeing these pages should convince you of that. It was nice how they reminded you of the year they were made. Constantly.




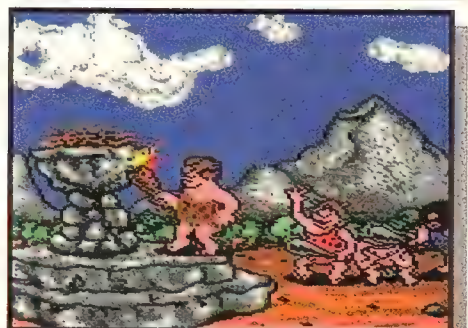
Caveman Ugh-lympics



I remember the first time I played Caveman Ugh-lympics in 1991 when I was five on my parents Commodore 64 (Which, BTW, was the first word I learnt to spell). The joys of being able to throw your friend in Mate Toss or trying to start a fire in Fire Making, A, B, A, B, A, B, Left, Right, Left, Right -crank crackle- as the joystick went and the outburst of laughter when you beat your older brother for the first time ever. Then just to get beaten over and over until he declares himself grand master Cave-lympian.



PLATFORM	INFO
	Plenty of clones of this game. There's far too many to list here, but let's just say that, if you were looking for a game to frig all the buttons on your controllers, you were spoilt for choice.



Doom shareware



| 1993

Let me take you back to my first 'true' multiplayer experience, back to early 1993. It was my 2nd year of high school, and one day my good friend approached me brandishing a null modem cable. 'DOOM shareware. This weekend.' We had a hard time getting it running. We discreetly harassed local computer businesses who managed to reveal our true intentions every time. . . 'This is for DOOM right?' After 24+ hours of swearing at the command line, we got it; and what we experienced in the few remaining hours was nothing short of pure magic. But DOOM speaks for itself.



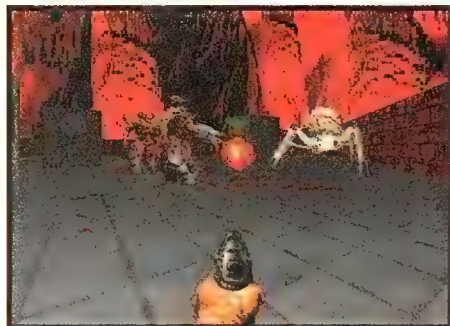
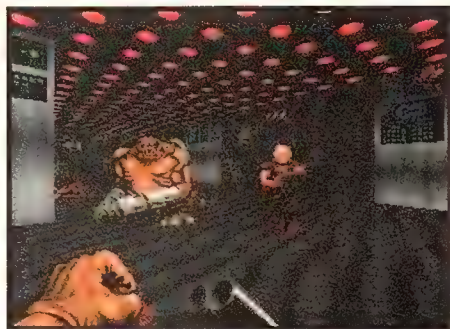
DOOM

PLATFORM

PC

INFO

Unlike the 'brush' BSP engines of today, DOOM relied on 2D sectors and nodes to render maps. If you look closely, you'll never see a free-floating block in DOOM. Ever.



Grim Fandango



| 1998

Sweet, intelligent, funny, poignant, distinctive are all apt adjectives to describe the genre-defining game that was Grim Fandango. This was a tremendously immersive and atmospheric adventure experience: bristling with delightfully intricate and funny characters (who can forget Glottis?), gorgeous (for those times) graphics, marvelous voice talents and a great, albeit a little rushed at the end, plot. Puzzles never became tiresome or convoluted and, thanks to the mastery of people at LucasArts, gameplay was polished to perfection. Grim Fandango was truly a remarkable game; a game with a heart and a message.



GRIM FANDANGO

PLATFORM

PC

INFO

Voodoo and skeletons – it's all good. Probably LucasArts last great adventure game. Nothing to do with the quality of the titles . . . it's just a dead genre.



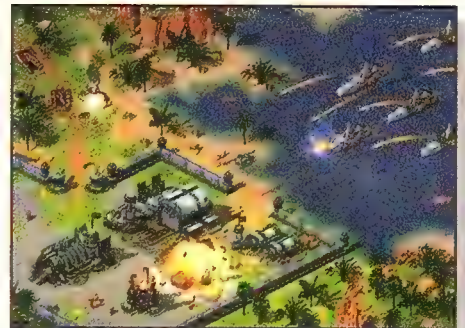
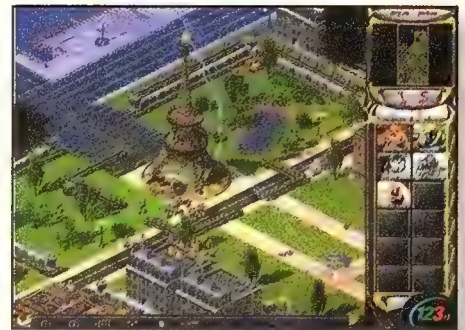
Red Alert 2: Command and Conquer



My introduction to RTS, my favourite genre. Hours were spent playing this game on my new P2 350, bought specifically for the purpose of C&C at higher resolutions. It was also my introduction to LANing. Sitting around at my friend's place, a beer in one hand, mouse in the other, 48 hours with no sleep, and one purpose, to destroy my best friends' newly created bases, winning bragging rights for the next week. Then home to play until my wrist ached in single player and online mode, training for victory the following weekend.

STEVE MARSHALL

PLATFORM	INFO
PC	Colourful. Yes, very bright and vibrant. Red Alert 2 was Westwood's next voxel attempt after Tiberian Sun. As good as it was, the tanks always looked like half-crushed tin cans.



Impossible Mission



Another room full of automated, electricity-spewing sentries. . . damn! Let's see. . . a couple of elevators, one or two gaps in the floor. . . bottomless as per usual. Got to search that desk on the second level for more clues. Only one snooze left, I think I better save it. Time is running out. GO! Sentry's back is turned, up the elevator! Start running towards the next one; have to time this jump perfectly. NOW! NO, it turned to quickly! AAAAARRRGHHH. Another death, learn from it, try again. Another visitor! Stay awhile! Staaaaaaay foreveeeeer!! And I'm happy to say I did.

MATTHEW ANDERSON

PLATFORM	INFO
C	It really was damn hard to finish this game. We're sure the developers took some perverse pleasure out of knowing they had released a game you couldn't win. Well, not easily anyway.



NBA Jam



Where do you start with this game, I mean it was way ahead of its time. Blistering speeds on the fast-break, then the almighty dunk. The dunking of course was what the game was all about from the Jordan-style to the somersault and the helicopter with sound effects, and if you jumped high enough and brought it down hard enough you could even break the glass. Hit three shots in a row without the opposition scoring and you're on fire, the ball is visually on fire and you can't miss. What a game. RESPECT!



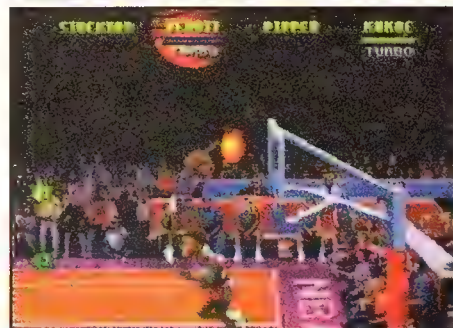
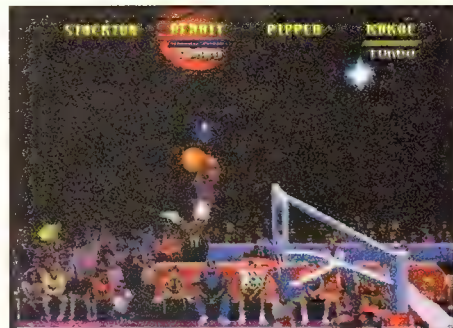
CHRIS THOMAS

PLATFORM

SEGA

INFO

There's a long legacy of basketball games. Some utterly ridiculous, and others, like NBA Jam, worthy of a controller bash. SEGA at its best.



Berzerk



Destroy the humanoid! With those words began the battle of my life. Robots, an endless supply of deadly robots with a singular purpose – to destroy me. So I wipe out a room of them to teach them a lesson, when Evil Otto – a round, smiling, bouncing Terminator who will stop at nothing to kill me – appears. I run. 'Chicken – fight like a robot!' His taunt follows me. No. I'll fight like a human, thank you. And I'm still fighting. Damn you robots to hell!



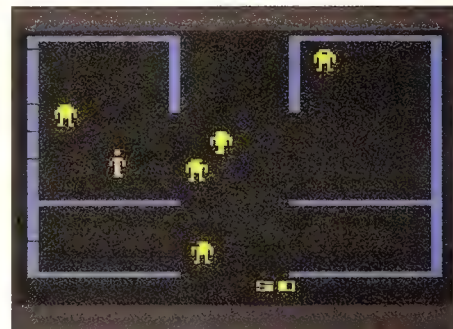
ANATOLE HUMPHREY

PLATFORM



INFO

Robots and guys in jumpsuits – there had to be something odd going on there. Whatever it was, it got the heart racing. . . pixels can be dangerous when they want to be.



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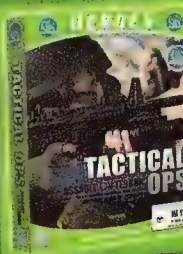
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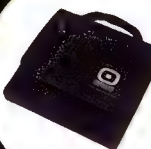
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	2G network	2.5G network	3G network	AUSTRALIAN MOBILE PROVIDERS
	Telstra	GSM and CDMA	CDMA-1X	Rather than move to a W-CDMA 3G network, Telstra has evolved its GSM service to include GPRS support and also launched its new Mobile Loop service based on an upgraded version of its existing CDMA network. Mobile Loop is a CDMA-1X based network, which
	Optus	GSM	GSM/GPRS	Optus do not yet have a 3G service, instead it operates a GSM/GPRS 2.5G network at present. Optus were the first to announce a 3G service and are expected to deliver later this year. This is likely to be W-CDMA based, using network hardware supplied by Nokia.
	Vodafone	GSM	GSM/GPRS	Vodafone looks likely to stick with its current Vodafone Live! 2.5G technology until demand for high bandwidth services exist. Once a decision is made a rollout is not expected until late 2004/early 2005. It is still not clear whether Vodafone will build its own network or lease existing bandwidth.
	Hutchinson	CDMA	W-CDMA	Hutchinson has been seen as a minor player with its Orange branded CDMA phone network, but is the first in Australia to deliver a W-CDMA 3G network called 3. Unlike Telstra's data focused mobile loop, 3 is heavily pushing the video messaging technologies that are supported by W-CDMA.

there have already been some seriously innovative programs like MP3 players and gaming emulators made for the OS.

The philosophy towards Symbian exemplifies the benefits of open standards. Finally we are no longer shackled to the functionality that the phone makers have decided we want. If your phone has support for expandable memory, then download an MP3 player. Sick of the games? Download a new one. It puts the choice back into our hands.

There are currently only a handful of Symbian-based phones on the market, but this number is set to expand as we move towards 3G. Fujitsu already has 3G ready handsets using Symbian over Japan's NTT DoCoMo network, but all the other phones are designed for use with GSM/GPRS based networks. Sony Ericsson only has one Symbian based phone in its lineup, the P800, which is also the only model available that uses the latest Version 7.0 OS. Nokia will soon release the 6600, which uses Symbian 7.0, and has an extensive lineup of Symbian phones out there already. Samsung and Siemens are the two other manufacturers with models prepped for launch sometime soon.

It is a big shift in thinking to move from proprietary operating systems that are tweaked and tuned to get the most out of a single hardware design to building the hardware that is not only powerful enough to run the OS, but to account for overheads needed by software that it yet to be written.

This could possibly lead to a generation of PDA-like super phones. The first of these pocket powerhouses is Nokia's N-Gage. Designed as a gaming

platform, N-Gage has an amazing amount of grunt for a mobile phone, leveraging a 100MHz StrongARM core to enable a new class of mobile gaming.

UNDER THE SKIN

Until now the actual hardware inside the phones has been irrelevant to the end user; as long as the phone works then who cares how much it can do. Sure, when coping with sluggish interfaces like those of Sony-Ericsson's T68i you can swear and curse at it, but with limited, contained systems like traditional GSM phones hardware has little relevance.

It is important to understand what hardware goes into the phones though, because it is very different to the PC technology we are familiar with. The first concept to abandon is the notion of a separate CPU or chipset. Mobile phones, like many other embedded electronic systems, are based around the System-On-a-Chip (SOC) design.

SOC is the umbrella term given to the design of ASICs (Application Specific Integrated Circuits). These chips are essentially all in one control devices; in the case of mobile phones they incorporate a CPU core, memory controller and cache memory, I/O controllers, display control and other necessary functions. This allows for highly customised solutions, and has been essential in the process of making mobiles into low-cost mass market devices.

Alongside the ASIC on the circuit board sits the main phone memory, some non-volatile storage (flash memory) for the OS and apps, the radio transmitter, audio hardware and kit for things like Bluetooth.

The key to designing these sorts of products is managing limited resources under a restricted power environment, which brings us to the other major part of a mobile phone; the battery.

Currently most phones use Lithium-Ion batteries to pack maximum charge and longevity into a small package. However as processing power and phone functionality increases so does the power drain. That's why you can squeeze a week between charges out of a fairly simple phone, but will have to recharge your sleek PDA-style unit every day or two.

The major advance due in this field will come when fuel cell technology actually reaches the point where it is viable. Currently there are a few barriers to viable fuel cells. The first is the size restrictions of mobiles. A battery needs to be tiny and powerful to go into a mobile and while the power is certainly there with current fuel cell developments, the size is still too large. When George Bush recently made a demonstration call using a fuel cell-powered phone at a technology congress he did so with a separate battery attached.

Secondary to this is the issue of stability. Fuel cells require highly explosive gases like methane and hydrogen to operate and while cells are designed to be stable, there are still too many concerns about them to be able to carry them on a flight without being locked inside an explosion-proof box. This is fine for transporting engineering samples, but is a barrier to ubiquitously fuel cell-powered communication.

While the battery and circuitry are the key components for getting your terminal to talk to your service provider,

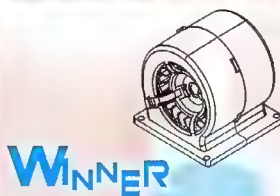


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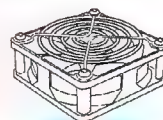
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WINNER

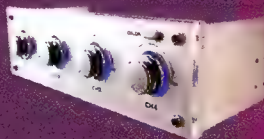
Air pushed directly & thoroughly
into center of heat sink.

VS



"Blind spot" underneath the fan
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AGI
AEROGATE I



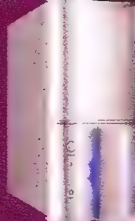
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TEXT-CRAZED TEENS

Reality TV apparently has an up-side if you're US telco AT&T. For it's the horribly sober karaoke-fest called *American Idol* that has been the biggest driver of SMS usage in the States.

The producers of the second series of *American Idol* teamed up with AT&T to introduce the ability to vote via SMS. Until that point the vast majority of Americans did not even realise that the service existed, let alone the potential. A big part of this is tied to the chaotic miasma that has traditionally been American mobile phones standards.

If we use Europe or Australia as an example, we leapt onto SMS as a form of communication quite early on. Part of this was smart marketing by telcos who followed the tried and true dealer method of giving away free messages to get us hooked, but the big part was that we're now comfortable with mobiles and have the network flexibility of GSM.

The really quirky thing is that the marketing tactics being used in the states to drive uptake are now being employed here. Just look at the appearance of SMS voting options in anything that once had a 1900 prefixed phone number as your only option.

In the states the take-up of SMS is increasing, with a 50% increase in usage measured already since last year, but has a long way to go until it gets to the level of 20 billion messages that are expected to be sent this year in the UK. SMS is now becoming the weapon of choice for marketers, just like photo messaging is set to become the weapon of choice for the generation of proto-stalkers nurtured on regular doses of *Big Brother*.

the shift towards 3G brings other phone components to the forefront.

In the past the most demanding graphical task a phone had to deal with was the custom Buffy operator logo that you downloaded to proudly display in all its black and white glory. Now the rise of picture messaging, Web access and gaming has combined with rapid price drops in TFT manufacturing cost to make full-colour displays the norm rather than the exception.

Most manufacturers still have phones with simple LCD displays for those who aren't after the next big thing, but some manufacturers, most notably Nokia, Sony-Ericsson and Samsung have begun a wholesale shift

to colour screens being the norm. There has been a rapid improvement from the 256-colour screens first used in models like Sony Ericsson's T68i to the 65,000-colour screens being used in high-end phones at the moment.

It remains to be seen just how far development of screens for mobile phones will progress. There is need to increase the resolution still for gaming and Web browsing, but there will be a limit as to how far the technology can be pushed and still deemed useful.

There is one other technology that has always been of major importance, and needs some sort of revolution to facilitate the uptake of mobile data services like email and MMS.

And that is interface. Not just the way that the menus appear on screen, but how the outer chassis of the phone works with the capabilities inside.

Anyone who has ever drunkenly typed a declaration of romantic intent from a pub at 3AM knows the importance of intuitive interface design. The simple fact that T9 text input can still cope under the weight of beer-fuelled finger bumbling is testament to how ingrained that little keypad has become.

T9 is good but it is still clumsy, plus you need to add all the swearing manually to avoid accidentally confusing someone by saying they are 'full of shiv'. In order for end users to move from deftly punching out 144-character SMS messages to unlimited length emails or other more tome-like efforts we need a means other than the keypad.

We have seen two different, but highly commendable approaches to this problem so far. Sony Ericsson has taken a leaf from the PDA world with its P800 and supports stylus-based handwriting or onscreen keyboard for those special compositions. This is quick and intuitive, and there is a real buzz that comes when you first hand-write an SMS to somebody.

Nokia has taken a different tack and has created the 6800. This tackles the typing problem by including a full QWERTY keyboard that folds out when you want to do some serious typing. While it certainly looks gimmicky, it is an amazingly useable piece of hardware nestling in a perfect typing position in your hand and giving rise to the notion of two-thumb typing.

While these sorts of innovations will continue to appear, the real hope for easy text interface will probably come

down the track with foldable PDA-style keyboards that can connect via Bluetooth or as a docking station for the phone. Whatever the solution, the interface barrier needs to be broken.

While it may be a few years until we trade our PCs in for more powerful phones, the convergence of standards and blossoming of hardware power makes for an industry just right for an insurgence of tech savvy types. Once this happens, mobiles will become damn interesting.

As trite as it sounds, there will always be a place for small, basic functionality mobile phones but the sky really is the limit for what can be done with phones such as those powered by Symbian. As time passes, more and more funky applications will emerge to turn phones into something unrecognisable today.

No longer is the pinnacle of mobile technology the ability to vote for the most plasticised, lobotomised wannabe pop star on *Australian Idol*. You can already get online and do some seriously interesting stuff, imagine what'll be possible with 2Mb/s 3G pipe running straight to your pants. ○



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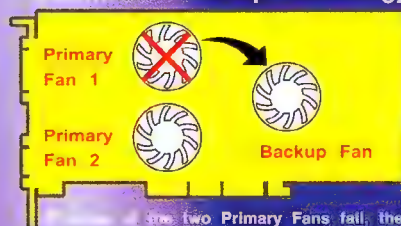
www.mobileconnectcard.vodafone.com



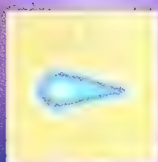
Enter at win@atomicmpc.com.au by answering this question: How did the Palestinian terrorist known as 'The Engineer' die?

Albatron Patented Technology **Wise Fan** (Included on card!)

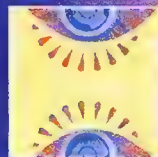
Patented 2+1 Backup® Technology



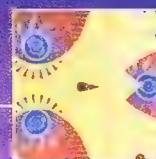
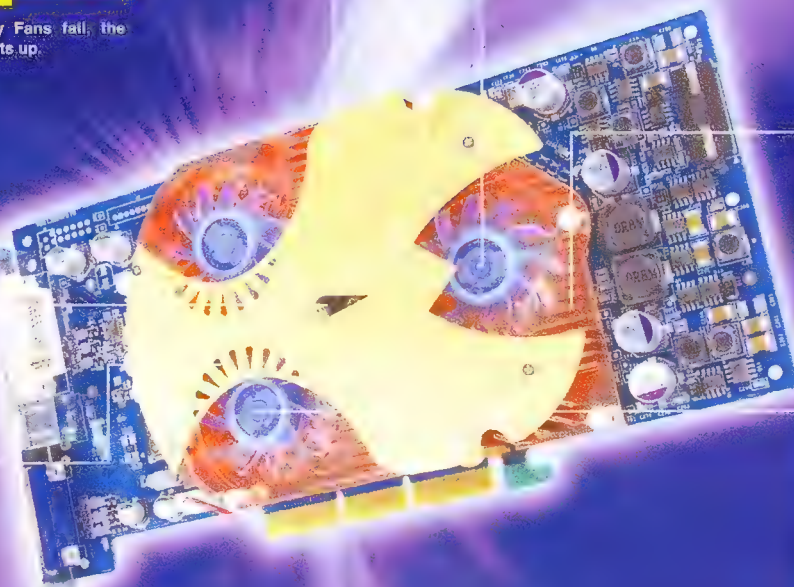
When all the two Primary Fans fail, the Backup Fan automatically starts up.



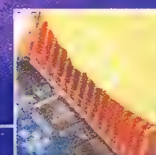
Bright blue LED light



Specially designed noise reduction wind vane

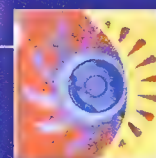


High-Speed Triple-Fan System



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Model	Operating Temperature
Other Brand FX5900 Fans	55.7°C
Albatron Wise Fan	40.1°C



Ultra-quiet, low-noise Fan (25 dBA)

Model	Sound Pressure Level (dB)
Other Brand FX5900 Fans	>40 dBA
Albatron Wise Fan	25 dBA

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- Bundled DVD Player software and two retail games.



The Tech Bag

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- Ultrafast 128 MB / 256-bit DDR Memory.
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- AGP 8X with D-Sub / TV-Out / DVI / VIVO ports.
- CineFX™ 2.0 engine supports Microsoft® DirectX® 9.0 & OpenGL 1.4.
- Intellisample™ HCT, UltraShadow™, nView™ multi-display technologies.
- Bundled DVD Player software and two retail games.

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20-odd centimetres of pointlessness

John Gilleooly weens himself off the cables.

Moments of spurious inspiration are wonderful things. Why only just on the way to work this morning I was hit with the quandary of how airline passengers are meant to fight against terrorists if there is only plastic cutlery onboard. One such thought that has dropped in the spuriousness stakes is the strange habit of people talking to themselves on street corners.

I am not talking about the 'stop stealing my thoughts' street howlers or the 'got a dollar' cry targeted at the general mass of humanity passing by, but those brave souls who have a hands-free phone kit and are actually prepared to use it.

The act of having a conversation with oneself has always engendered an air of craziness. People who loudly argue with themselves are often called fruitcakes, people who talk calmly and quietly eccentric; it is one of the lasting and fundamental divides of human behaviour.

The advent of mobile telephony has brought this to a head. For so many reasons a hands-free kit is a good idea; it may or may not protect you from radiation damage or lack thereof based upon the study du jour, it saves you fumbling through pockets for your phone when it rings and it can pump out radio or maybe MP3 audio while you aren't on the phone.

Everything about it is perfect except the fact you feel like an abject tool carrying on a conversation with the voice in your head whenever the phone rings. At least by holding the phone to your ear you show that you're engaged in an obviously important phone call, not just staring into space and loudly extolling your dinner plans to anything that will listen.

People are definitely becoming more tolerant to these 'techcentrics', with the common unconscious reaction now to look for dangling wires before mentally dooming the self-talker to the realms of the loopy. Of course, the advent of Bluetooth means that wires need not necessarily be present.

I say 'need not be present' because when talking with Nokia about this month's mobile phone feature a strange fact emerged. Nokia's next Bluetooth hands-free kit will not be one of those bad sci-fi type ear-mounted doohickies but rather a unit that you can keep in your top pocket and use via normal cabled earphones. Look at Sony-Ericsson's Website and you will see them doing the same thing.

Now, maybe I am not the smartest tiger in Africa, but doesn't that defeat the entire purpose of Bluetooth and the Personal Area Network (PAN) concept? I thought the main reason Bluetooth and its short range existed was so we could eliminate wires altogether. Frankly, using such amazing technology to bridge a 20cm gap between your belt and your top pocket is the silliest thing I've heard since Microsoft introduced the multi-thousand dollar tablet PC on the premise it delivers the same experience as a \$1 notepad.

Bluetooth on phones does have a great future now that the hype has died down somewhat. It has taken a long time for this standard to mature and more importantly gain widespread support from device manufacturers since it was first proposed in 1998. Unlike wireless LAN and GPRS technology, Bluetooth was always designed to work over very short ranges as part of the PAN concept.

PAN is a damn cool idea, referring to

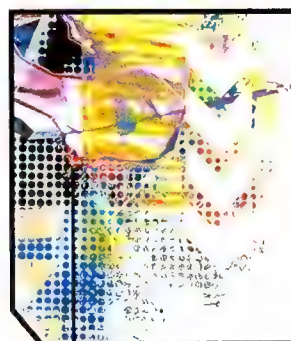
the ability to hook multiple devices from multiple vendors together without wires. Its main use until recently has been to link devices like PDAs and laptops to GPRS phones for Internet use, but the recent swag of phones that support Bluetooth has meant that devices like headsets for phones are becoming more common.

Perhaps the funkiest use is coming with devices like Sony-Ericsson's HBM-30 Bluetooth MP3 player. This points towards a move into linking all those new generation personal devices together, but I still feel it's not far enough.

How does this sound. Imagine a hard drive-based MP3 player like an iPod with decent Bluetooth support and the ability to seamlessly link with your mobile phone to not only stream music, but also to work as mobile storage for the promised 2MB/s download speeds of 3G or even as a dumping ground for the snap happy. It would mean that phone-based video would be more than a five-second glimpse of Uncle Fred's birthday party.

Imagine it. You are in the near future, walking down the street chatting to a friend, who mentions Ween's timeless hit *Push The Little Daisies* just as he hangs up. You continue on, but are unable to get it out of your head. So, you fire up your GPRS Net connection and instantly stream it to your phone via a Java version of weenamp (www.ween.com). Play it back on your MP3 player and get on with your life.

It's a great concept and shouldn't be too hard to do. Bluetooth is finally starting to find its feet and the rest of the market is moving in a direction that finally allows proper use of PANs. And the possibilities are damn cool.



artomic

'Mikrocomputer' by Nick Wannop

Inspiration and resources for this image came from a page full of old, german computer advertisements (www.zock.com/8-bit/D_Werbung.html). The TRS80 III, Superbrain and family playing Nintendo were drawn in Flash using a Wacom Graphire tablet. The text at the top came from a TRS80 ad and the bottom text was roughly translated by Babel Fish. Finally, everything was slapped together in Photoshop.

Create the winning Artomic and win the latest version of Photoshop Elements and Photoshop Album from Adobe! Email a preview (no larger than 5MB) of your games or hardware-themed masterpiece to artomic@atomicmpc.com.au.



Benchmarks

At *Atomic*, it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic* Labs.

SYSmark2002

SYSmark2002 is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The focus of the benchmark is on Internet Content Creation and Office Productivity tasks, which combine to produce a final performance rating.

Unreal Tournament 2003

UT2K3 is the latest and greatest first person shooter from Epic. The game makes use of the new Unreal Warfare engine, and as such is a perfect benchmark for system performance. We use HardOCP's (www.hardocp.com) benchmarking utility to run a series of flyby benchmarks at varying resolutions to test performance. The utility also features support for a low resolution/high geometry CPU test. Results are in average frames per second.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo,

which outputs an average framerate trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for making comparisons between video chipsets.

HSF testing – Chernobyl

To test heatsink fans we use our custom engineered CPU replicator, known as Chernobyl. This beastie pumps a variable wattage through a solid Copper CPU die replica, with a temperature probe mounted in the exact centre of the die replica. Chernobyl results are not directly comparable with real world temperatures, but do provide a very accurate benchmark.

Quake 3: Arena AtomicMPC demo

Quake 3: Arena (Q3A), from id Software, is a very popular first person shooter, and represents widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, so we developed our own *AtomicMPC* demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance, or a particular facet of 3D, such as T&L. We can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark to perform these tests. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HDD heatsinks.

Atomic Hot Award

The *Atomic* HOT award is given only to the most kickarse products to hit the Labs, ones that score nine or greater.



ATOMIC TESTBENCH SPECS

Both test systems use Windows XP Professional with Service Pack 1, DirectX 8.1 and the latest chipset and video drivers.

- AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA: www.cassa.com.au)
- Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT: www.abit.com.tw)

Common components

- Corsair TwinX XMS3200 matched dual-channel DDR RAM (supplied by Altech www.altech.com.au)
- Hercules Prophet II GTS 32MB (supplied by Guillemot: <http://au.hercules.com>)
- 64MB Apacer memory keys (supplied by Anyware: www.anyware.com.au)
- Hercules Prophet II GTS 32MB (Supplied by Guillemot: www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia: www.creaf.com)
- ASUS 52x CD-ROM (supplied by CASSA)
- Belkin PCI FireWire card (supplied by Belkin: www.belkin.com.au)
- Belkin PCI USB 2.0 card (supplied by Belkin)

BENCHMARK SETTINGS

3DMark2001SE Pro

- 1,024 x 768; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.
- 1,024 x 768; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.
- 1,600 x 1,200; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.
- 1,600 x 1,200; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.

Quake 3: Arena AtomicMPC Demo

All tests use Quake 3: Arena 1.27g and our custom Q3A demo recorded by the *Atomic* staff.

- CPU testing: 320 x 240; maximum geometry detail; minimum graphics settings; high sound quality.
- Graphics cards: Low quality – 1,024 x 768; normal quality graphics settings; sound disabled.
- Medium – 1,280 x 1,024; maximum graphics settings; with all game sound disabled.
- High – 1,600 x 1,200; maximum graphics settings; with all game sound disabled.

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ATLANTIS RADEON 9800 PRO

[FEATURES]

- RADEON 9800 PRO Visual Processing Unit (VPU)
- 256MB or 128MB DDR memory accelerates the latest 3D games
- 256-bit memory interface removes hardware performance bottleneck and provides end users with faster 3D graphics
- Supports AGP 4X/2X/8X, DirectX® 9.0 and the latest OpenGL® functionality
- New SMARTSHADER™ 2.1, SMOOTHVISION™ 2.1, Unique VIDEOSHADER™ engine, ATI's new FULLSTREAM, Hydrowision



ATLANTIS RADEON 9600 PRO

[FEATURES]

- RADEON™ 9600 PRO Visual Processing Unit (VPU)
- Industry's only 4-pipeline graphics solution in its 2nd generation, providing twice the rendering power of any currently competing product.
- Supports AGP 4X/2X/8X, DirectX® 9.0 and the latest OpenGL® functionality
- New SMARTSHADER™ 2.1, SMOOTHVISION™ 2.1, Unique VIDEOSHADER™ engine, ATI's new FULLSTREAM, Hydrowision



ATLANTIS RADEON 9200

[FEATURES]

- RADEON™ 9200 Visual Processing Unit (VPU)
- 128MB DDR memory accelerates the latest 3D games
- Industry's only 4-pipeline graphics solution in its 2nd generation, providing twice the rendering power of any currently competing product
- Supports AGP 4X/2X/8X, DirectX® 9.0 and the latest OpenGL® functionality
- New SMARTSHADER™ 2.1, SMOOTHVISION™ 2.1, Unique VIDEOSHADER™ engine, ATI's new FULLSTREAM



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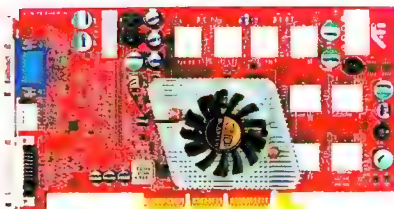
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Framerate

If you've had your picture taken, chances are your smitten little face has appeared framed, somewhere. This is an exciting thing. Yes it is. And at this rate, it'll be so exciting your socks will combust and set the hairs on your legs on fire. Just like a toasty heatsink.



Creative RX 9800 PRO

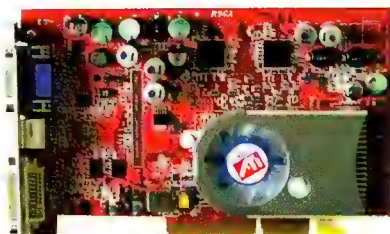
SPECIFICATIONS: ATI RADEON 9800 PRO; 256MB 256-bit DDR-RAM; dual-400MHz RAMDACs; TV-out

CORE SPEED: 380MHz **MEMORY SPEED:** 700MHz **PRICE:** \$999

WEBSITE: Creative australia.creative.com

SUPPLIER: Creative australia.creative.com

Creative has been in the 3D market since the beginning, and while it maintains a lower profile in this realm these days, it still has a range of good quality ATI-based graphics cards out there, and at the top sits this 256MB version of the RADEON 9800 PRO.



Powercolor RADEON 9600 PRO Brave Edition

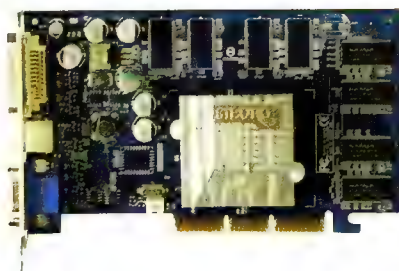
SPECIFICATIONS: ATI RADEON 9600 PRO; 128MB 256-bit DDR-RAM; dual-400MHz RAMDACs; TV-out

CORE SPEED: 400MHz **MEMORY SPEED:** 680MHz **PRICE:** \$341

WEBSITE: Powercolor www.powercolor.com.tw

SUPPLIER: Australia IT www.australiait.com.au

Powercolor was not content to stick with stock speeds for its RADEON 9600 PRO, deciding instead to bump memory speeds a little in pursuit of better performance. There is a miniscule difference to be seen, and is nothing that will dramatically change the gaming experience.



ABIT Siluro FX5200

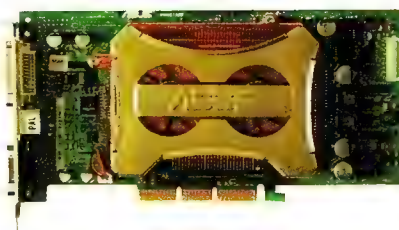
SPECIFICATIONS: NVIDIA GeForce FX 5200; 128MB DDR RAM; dual-350MHz RAMDACs; TV-out

CORE SPEED: 250MHz **MEMORY SPEED:** 250MHz **PRICE:** \$159

WEBSITE: ABIT www.abit.com.tw

SUPPLIER: Altech www.altech.com.au

This card is very budget, with a funky passive heatsink designed as a 3D ABIT logo. Unfortunately, there's a big chance accidental bumpage could cause said logo to become permanently etched into your skin. This card is hotter than any other we have tested, and not in a good way.



ASUS V9950 TD FX5900

SPECIFICATIONS: NVIDIA GeForce FX 5900 Ultra; 128MB DDR RAM; dual-400MHz RAMDACs, TV-out

CORE SPEED: 400MHz **MEMORY SPEED:** 850MHz **PRICE:** \$899

WEBSITE: ASUS www.asus.com.tw

SUPPLIER: Achieva www.achieva.com.au

Now that a semblance of parity has returned between NVIDIA and ATI's graphics card offerings, the GeForce FX 5900 Ultra has become a viable option. This offering from ASUS performs well and thankfully comes with a sleek heatsink that will not consume all your spare PCI space.

Video cards

Thanks to the rapid uptake of DirectX 9.0 shaders and the simplicity inherent in coding for High Level Shader Languages (HLSL), the tumbleweed slowly rolling through the graphics card market is beautifully pixel-shaded and we could count at least eight distinct light-sourced shadows as it passed.

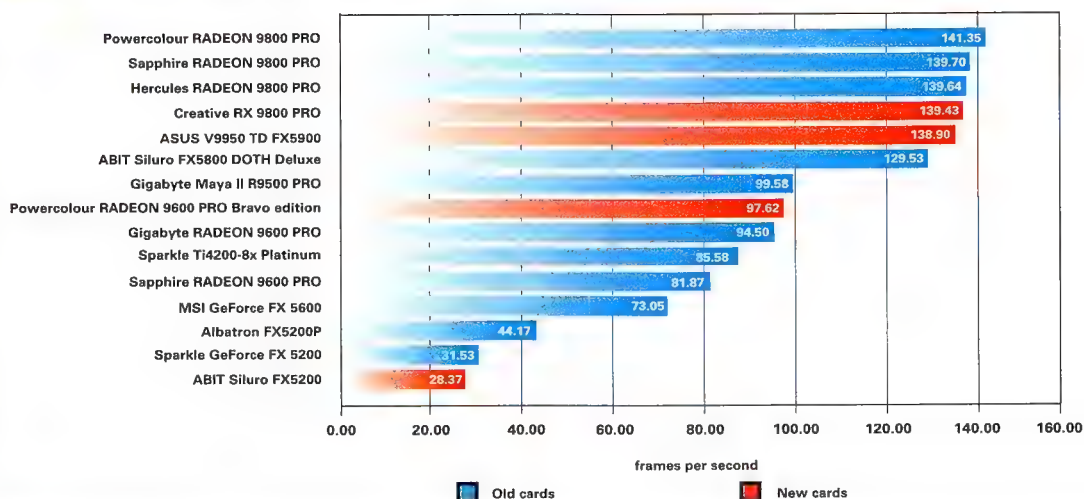
This is definitely dead time in the video market. The latest refresh flurry has subsided and NVIDIA and ATI have

retreated to their bunkers to prepare for the battle at the end of the year. Expect announcements to happen over the Computex-COMDEX period later this year.

The only new product line to emerge this month is NVIDIA's new Personal Cinema, which is a big salvo at ATI's stunning ALL-IN-WONDER range.

We have managed to get an Australian exclusive look at the MSI FX5200 Personal Cinema on *page 64*.

Unreal Tournament 2003 – 1,280 x 1,024



CPUs

There have been some minor movements on the CPU front over the past month, but we are still waiting for the anticipated glut of announcements scheduled during September as the combination of Intel's Fall IDF event and the expected unveiling of the Athlon 64 at Computex.

In the interim we have AMD's recent launch of the single-processor Opteron series, with Opteron 142, 144 and 146 models appearing.

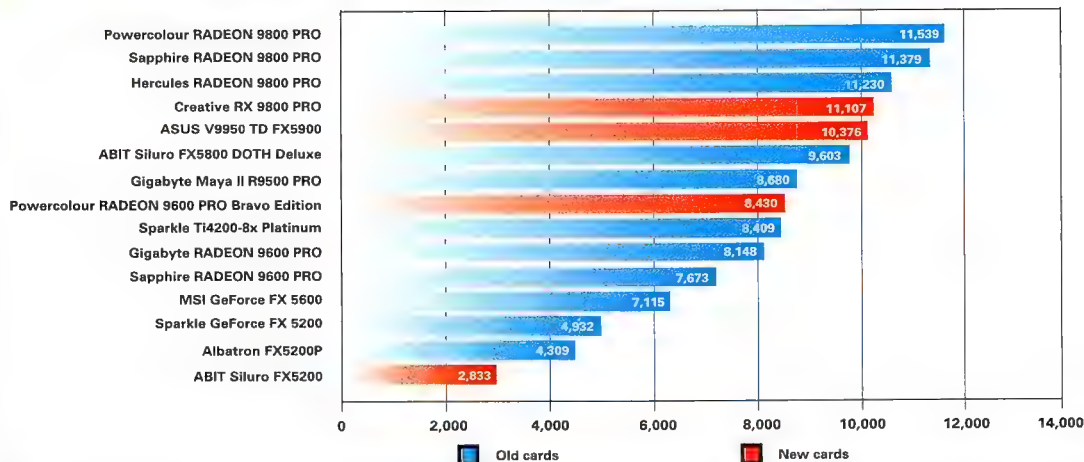
These single-processors differ from the dual-processor

series only in the number of supported HyperTransport links (one instead of two) so therefore they will not work in dual-CPU configurations.

We are also finally seeing some Opteron boards appear for workstations, they are based around the nForce3 Pro chipset from NVIDIA.

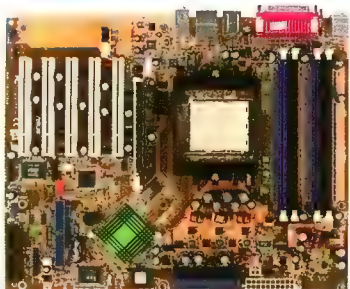
Soon we can expect VIA's offering, so that by the time the Athlon 64 launches there will be plenty of motherboard options available on the market.

3DMark2001SE Pro – 1,280 x 1,024



ASUS SK8N

With full 64-bit yet to be unleashed, John Gillooly goes SK8N the Opteron's half-pipes.



The nForce3 Professional has had *Atomic* all excited since it was announced with the launch of AMD's Opteron. While it's destined to end up as one of the major competitors in the Athlon 64 chipset market, the first implementation of the nForce3 Professional

is for single processor Opteron workstations.

NVIDIA has come a long way in the chipset market, riding high on the back of nForce2. While its first attempt at a chipset, the nForce, had its merits, it was not until nForce2 that NVIDIA took a clear lead in regards to performance and features. This has evolved into the nForce3 Professional.

This emergence has taken the form of ASUS' SK8N motherboard. Thanks to the integrated memory controller on the Opteron CPU, there is no Northbridge, and this effects the whole board layout, placing the new Socket 940 CPU mounting in the centre of the board, with RAM sockets above and PCI slots below. The nForce3 Professional chip sits near the AGP slot and uses a passive heatsink. Unlike the nForce2, there's no integrated graphics, which means that cooling of the chipset is less of an issue.

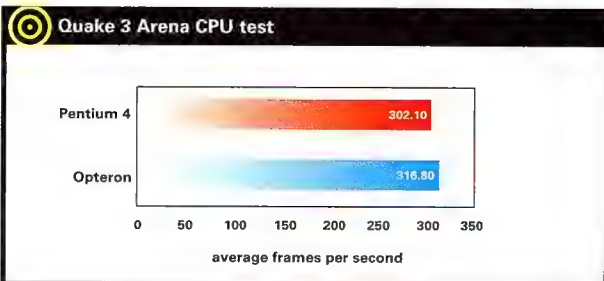
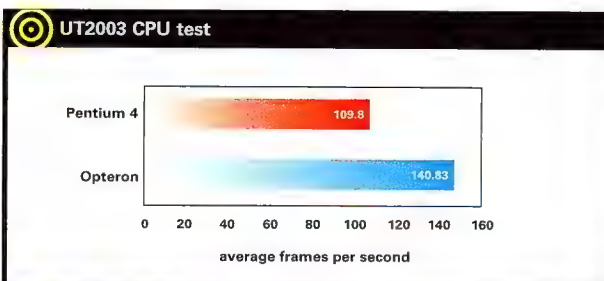
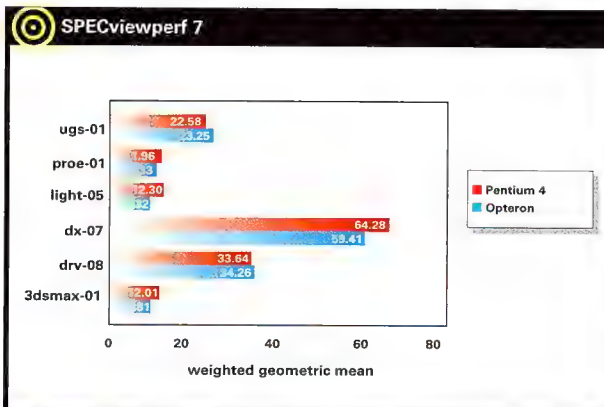
It must be noted that the SK8N is designed for workstation use, which brings in a few restrictions that won't please enthusiasts who want to play with the AMD64 architecture before the release of the consumer-level Athlon 64. Firstly, the SK8N requires registered ECC DDR RAM to run. Secondly, the nForce3 Professional chipset doesn't support the more consumer-oriented functions of the nForce2 like Dolby 5.1 sound or native IEEE 1394 support. It does however support three native ATA133 channels and the option of two SATA channels using bridging chips.

ASUS has overcome the chipset limitations by using a discrete IEEE 1394 controller chip, AC'97 audio and a Promise combo controller for SATA support.

We tested the board in an environment typical of current usage. There is still no available code for the AMD64-supported version of Windows, so we've tested using the normal 32-bit version. We will however revisit the nForce3 once there is code available.

We've used an Opteron 244 CPU, SK8N, RADEON 9800 PRO and 1GB of registered ECC DDR266. The SK8N supports DDR266 and DDR333 but unfortunately DDR266 was all that was available when testing. We have compared the results to a 3GHz Pentium 4, Intel D875PBZ motherboard, RADEON 9800 PRO and 1GB DDR266. Both systems run the memory in dual-channel configurations and from our testing the systems both appear restricted by memory bandwidth.

What is surprising is that the Opteron, with its 1.8GHz of CPU speed manages to stay neck and neck with the Pentium 4. We are dealing with fairly different architectures in the tests, so it's not surprising that the results swing between favouring the two CPUs. The most telling test of workstation performance is the SPECviewperf results, in which the Opteron wins some tests and the Pentium 4 wins others.



We acknowledge that the Opteron will have much more overhead once support becomes available for the 64-bit functionality built into the CPU. For now we can see the combination of AMD CPU and NVIDIA chipset has managed to deliver performance that can compete with a CPU of much higher clockspeed.

The SK8N provides a solid, if somewhat unexciting, platform for the Opteron, delivering great performance now and promising even more once 64-bit software becomes available in the future.

JG

SPECIFICATIONS:

NVIDIA nForce3 Professional; needs registered ECC DDR RAM; 10/100 Ethernet; IEEE 1394; AC'97 audio.

WEBSITE: ASUS www.asus.com

SUPPLIER: Achieva www.achieva.com.au

PHONE: Achieva (02) 9742 3288

PRICE: \$439

SCORE

8/10

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PC Authority August 2003

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PC User April 2003



Vitesse p4 3000

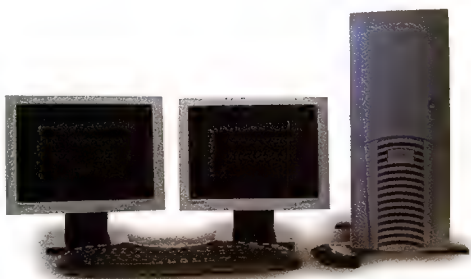
Intel Pentium 4C 3.0GHz
Intel 865PE Chipset, SATA, Firewire
512MB PC3200 DDR SDRAM
128MB Radeon 9800 SE
17" Black CRT Monitor
80GB 7200rpm HDD 8MB Cache
52x24x52 CDRW Drive, FDD
6 Channel Digital Audio
Creative Desktop Speakers
56K Internal Modem, 10/100 LAN
Belkin Cordless Keyboard/Mouse
Windows XP Home Edition

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Vitesse p4 3200

Intel Pentium 4C 3.2GHz
Intel 865PE Chipset, SATA, Firewire
1GB PC3200 DDR SDRAM
128MB Radeon 9800 Pro
19" Black CRT Monitor
120GB 7200rpm HDD 8MB Cache
4X DVD+/-RW Drive
6 Channel Digital Audio
Creative 2400 2.1 Speakers
56K Internal Modem, 10/100 LAN
Belkin Cordless Keyboard/Mouse
Windows XP Professional

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2x Intel Xeon 2.4GHz 533MHz FSB
Intel i7505 Chipset
1024MB PC2100 ECC DDR SDRAM
128MB Quadro4 750 XGL
19" Black Flat CRT Monitor
80GB 7200rpm HDD 8MB Cache
52x32x52 CDRW Drive, FDD
6 Channel Digital Audio
Creative Desktop Speakers
Integrated Gigabit Ethernet
Belkin Cordless Keyboard/Mouse
Windows XP Professional

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128MB Quadro FX 1000
19" Black Flat CRT Monitor
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4X DVD+/-RW Drive, FDD
6 Channel Digital Audio
Creative Desktop Speakers
Integrated Gigabit Ethernet
Belkin Cordless Keyboard/Mouse
Windows XP Professional

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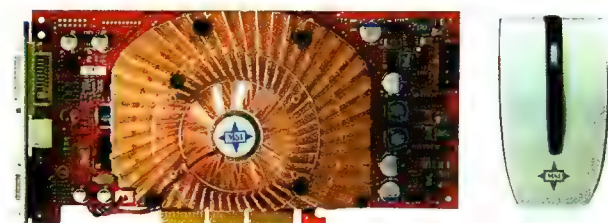
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MSI nBOX

Nathan Davis gets n-chanted over this nice play box.



With the advent of NVIDIA's deafening GeForce FX range of cards, the performance of its cards has been somewhat lacking compared to the hound dogs ATI has on the market. The nBOX is MSI's latest FX endeavour. It's thrown a video card in a larger than normal box along with other miscellaneous goodies. Hence the quite frankly dull name, 'nBOX'. The main focus of the nBOX is, of course, the contained GeForce FX 5900 Ultra video card, but what's a surprise is the included bundle of gaming nirvana. Well, it's a start anyhow.

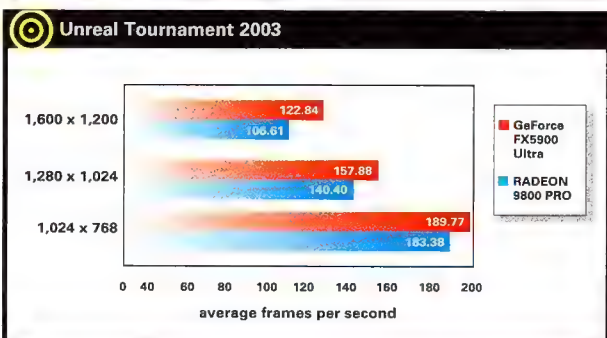
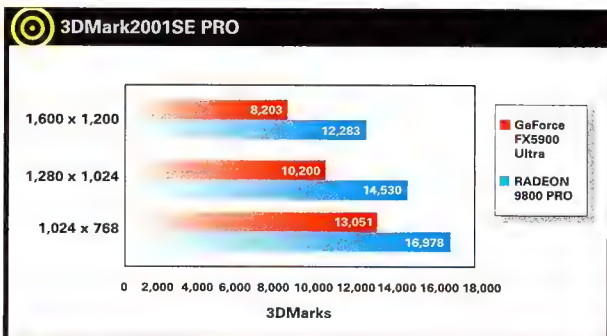
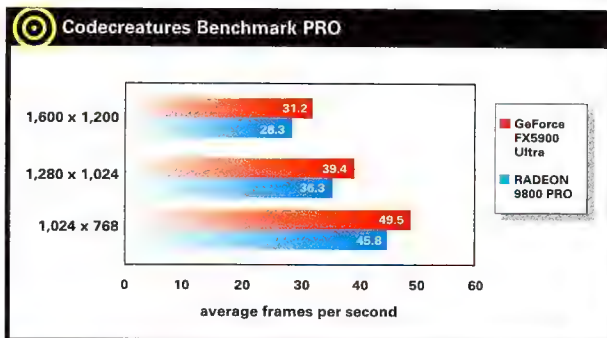
Two neat games come packed with the nBOX: C&C Generals and Battlefield 1942. Though these are great games, they've been around a while, with most people who intend on purchasing a card this high in specs already owning them. For the sake of mentioning it, Unreal II is also included.

The nBOX also comes with a mini-mouse. It screams 'Star Trek' with its aluminium top and blue glowing scroller. It's one of the most lightweight mice we've used, making us wonder whether there's anything actually in there but the light. Whatever's there it works perfectly, as it packs a lustrously smooth 800dpi – and it certainly shows. Not all is silky sailing though, with the mouse's rather bold shape edging on uncomfortable and slightly painful after a good use – for ET hands only.

On the video card, the newer radial-heatsink design on both sides certainly adds to the weight, but this cooling has an immediately obvious advantage. An atmosphere no longer forms around your machine, abruptly storming into a visible funnel of blistering noise – this is a pretty damn quiet FX 5900 Ultra video card.

The testbench consisted of an Athlon XP 3200+, two sticks of 256MB DDR400 and a KT600 board. We pitted the GeForce FX 5900 Ultra against ATI's top performer, the 256MB RADEON 9800 PRO. The core speed of the 5900 Ultra is 450MHz and the memory runs at an effective 850MHz, with the 9800 PRO core at 380MHz and an effective memory speed of 700MHz. The core of the 9800 PRO may be slower, but it isn't required to be nearly as fast as the 5900 Ultra, as in many ways, it's running a more superior architecture.

Regardless, NVIDIA has finally stolen the much vaunted panama of reign from ATI, with the 5900 Ultra consistently outdoing the 9800 PRO in both the Code Creatures and UT2003 bench tests. Like the 9800 PRO, the 5900 Ultra is running on a 256-bit memory bus, boasting 27.2GB of memory bandwidth, as compared to the slower 22.4GB RADEON 9800 PRO. This shows in testing with the 5900 Ultra performing as much as 7.5% faster in Code Creatures and 11% faster in UT2003 – however in 3DMark2001SE PRO it dropped way off target, with the RADEON pulling ahead with a substantial 29.8% lead. This is all thanks to the RADEON's superior pixel shaders – only noticeable in games that specifically make use of them, but



they're already beginning to arrive. Tomb Raider: Angel of Darkness, for example.

In the end, with vanilla 5900 Ultra cards available on their own \$100+ cheaper, perhaps this is still a good buy, with around \$250 worth of goodies. Add the fact it's a great performer and very quiet, and this is some decent gear. If money is no object and you happen to require a new mouse – which you'll end up begging your younger brother/sister to take away – point your n-wallet right this way.

ND

SPECIFICATIONS:

NVIDIA GeForce FX 5900 Ultra; 256MB DDR RAM; video-in; TV-out; USB 800dpi mouse; C&C Generals; Battlefield 1942; Unreal II: The Awakening.

WEBSITE: MSI www.msi.com.tw

SUPPLIER: MSI www.msicomputer.com.au

PHONE: (02) 9748 0070

PRICE: \$1,100

SCORE:

8/10



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Giant II

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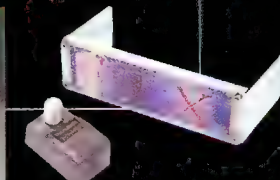
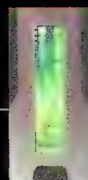
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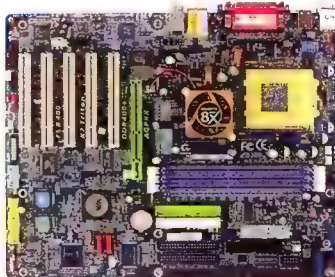
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EMAIL: sales@thermaltake.com.au

<http://www.thermaltake.com.au>

Gigabyte Triton GA-7VT600 1394

Nathan Davis warns 'may the Force fear the return of VIA.'



Gigabyte is a company well known for offering some of the best high-end motherboards at reasonable cost. This is also the case with its low-end boards – still packed with features but not twinned with an appropriately premium

price, instead opting for ridiculously cheap. This works fine for us, as you might imagine.

Aimed at the middle range of the market and taking over from the success of the KT400A, is Gigabyte's first board sporting VIA's brand new 400MHz FSB KT600 chipset – the GA-7VT600 1394.

In fact, Gigabyte is the very first manufacturer to hit the market with this brand spanking new chipset, and ties in perfectly with the now available 400MHz FSB Barton-cored Athlon 3200+.

This budget board continues the trajectory of Gigabyte's legacy, again adding even more features and functionality than was believed possible on a budget board. Basically, this is one humdinger of a board. It supports up to 3GB of DDR400 RAM and the memory options in the BIOS are like most top of the range Gigabyte boards, with extremely configurable latencies and many other tweaky bits you may have fancies for.

Being a KT600 board, this is actually the first VIA board to support integrated Serial ATA. There are two SATA ports included and will have you ready for some hot-swapping hard drive action, and there's also FireWire support (via a back plate). Then of course there are all the usual extras like an onboard 10/100 Ethernet port, dual-BIOS (one screws up, the other begins 'The Fixening'), AGP 8x slot, six USB 2.0 ports and onboard six-channel AC'97 audio. Hidden in this feature jungle is also the standard two ATA133 channels.

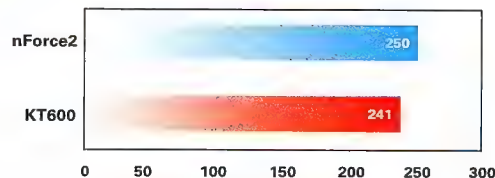
The 'Smart Fan' ability is a natty addition. This automatically changes the speed of the CPU and Northbridge fans depending on how high the temperatures are flying. Though realistically, the fans won't be slowing down too often with a hot and feisty AMD processor installed. But it might save your CPU if your heatsink decides to retire from its cooling duties. (Read: falls off.)

Well, let's see how the KT600 chipset stacks up against the nForce2. To assure you there's nothing tricky going on behind the scenes (the butt monkeys are after you, conspiracist!), we pitted this against another Gigabyte board, the 7NXXP Ultra with the nForce2 chipset.

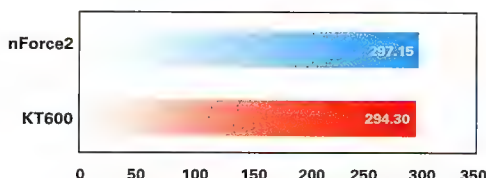
This mobo is aimed at the performance-demanding tweekers out there. The common bits we used were an Athlon 3200+ (2.2GHz), two sticks of DDR400 and a 128MB GeForce FX 5200.

The nForce2 can keep its pants on for now, but it's up against some aggressive rivalry. Just look at the results – absolutely astounding for a far cheaper board. The KT600 came in just a tad under the nForce2 by nine points in SYSmark2002, and hardly anything at all in the game

SYSmark2002 rating



Quake 3 Arena average fps



tests. Forgive me – by all three frames in Quake 3 Arena and a mind-boggling one-sixteenth of a frame in Unreal Tournament 2003 (obviously we didn't print that).

We used the 7NXXP for the prime reason that it's an nForce2 board; we're not going to compare the features and price factor of this 'deluxe' model to the 7VT600 – it wouldn't be fair. However, there are plenty of plain nForce2 boards priced around the \$200 mark.

The 7NXXP does support dual-channel DDR, but the results merely confirm what was noted in the Head-to-Head last month. Dual-channel will do a heap of nothing for AMD chips unless you're creating lots of I/O traffic. Like a drunk fighting off evil gerbils.

The 7VT600 1394 with its features and performance, is among the more decent boards in the mid-range market.

It's in no way revolutionary, but it's great to see VIA back up there with a competitive weapon, after six long months of bland performance.

When you put into consideration its price and target audience, this delight of capacitor-filled heat-producing goodness will satisfy the mothering needs.

ND

SPECIFICATIONS:

VIA KT600 chipset; SATA; USB 2.0; IEEE 1394; six-channel AC'97 audio; onboard Ethernet; dual-BIOS.

WEBSITE: Gigabyte www.giga-byte.com

SUPPLIER: Synnex www.synnex.com.au

PHONE: Synnex 1300 880 038

PRICE: \$189

SCORE:

8/10

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Corsair HydroCool200

Nathan Davis loses control of his hydrocyst over this large liquid gusher.



With the waves of CPU water cooling kits crashing onto the market, even one of the world's most respected memory manufacturers, Corsair Memory Inc, has jiggered its way onto the watery bandwagon.

This is where you screw your face up, tilt head to the left and stare blankly at this page. You can fix yourself up now.

Regardless of how they decided to jump into this market, we are reasonably confident, as they tend to have a particular eye for detail. Sounding like a 'CompuGlobalHyperMegaNet' product, the HydroCool200 CPU water cooler should be enough to get your mouth bubblers flushing at full stream.

To the main unit itself, capable of removing up to 200W of heat, unless you have the largest case known to humankind, this behemoth sits outside your machine, with the pipes and power/controller cable running through a controller card that locates in a spare (read: wasted) PCI slot back plate. Where you fit the unit is another pack of pebbles, as this thing is huge, measuring in at a wonderful 16cm x 16.5cm x 34.5cm.

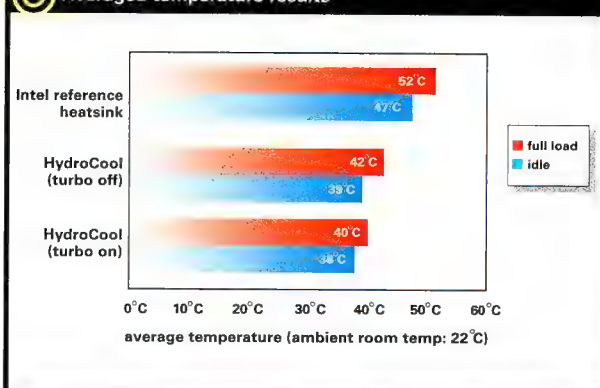
Luckily it has a carry handle, as it also has a bit of weight to it – not ideal, but it can be carried around without too much difficulty.

There's something really nice that Corsair have implemented into the cooling pipes. You can imagine the difficulty to be had with this system when attempting to cart it around. Well, not only are they made for easy 'removal on the run' (i.e. no, not hot-swappable) with a clip-like connection, but when disconnecting, instead of crossing your fingers and hoping all the water will actually escape in a bucket, the cooling pipes have an ingenious design. They have a valve at each end, which, when unplugged, completely block any movement of water. Well, a drip or two of coolant may manage to escape, but this prevents any real nasty spillage and makes travelling with it two hells easier. An absolute godsend, as it doesn't require the sacrificing of tools in order to attach them (see page 66) – no tools required here except for the occasional flathead screwdriving.

On the front there's an LCD display for the waterblock's temperature (both Celsius and Fahrenheit). There's also a button below it, which is used for setting the warning shutdown/alarm settings. In essence, this is a great idea, but as the CPU itself isn't being monitored, it's not ideal, displaying almost half that of the processor. A separate thermal probe would have been an attractive addition. There is a turbo button, which, when activated, lowers the degrees a few by increasing the speed of the radiator's fan several notches. And the noise factor too, which is slightly above ignorable.

Packaged with brackets for both AMD's and Intel's line

Averaged temperature results



of processors, setting up wasn't much of a hassle, as it was a simple matter of securing the surprisingly small waterblock in place with the retention clips and plugging in the cables. With all the cables provided, it would have been nice to see a fan speed reporting wire to bung into the existing processor plug on the mobo, as some boards require a speed-reading from the fan in order to boot.

On to testing, and we bench tested with a Pentium 4 3.06GHz running at default speed on an Abit BH7 mobo and using Motherboard Monitor v5.0 to capture the calefaction. The ambient room temperature a steady 22°C throughout the testing. Compared to Intel's latest reference heatsink (and current reigning champion), it performs amazingly well, with the heatsink hovering at 52°C under load and 47°C idle.

Back to the HydroCool, with turbo turned off, we gave the CPU an anxiety attack in SiSoft Sandra's burn-in mode. As you can see, it returned a very tasty average of 42°C, sitting on a derisory 40°C when running at turbo.

Idle temperatures were a few degrees lower for both the standard and turbo speeds. The temperatures this manages to keep are more than reasonably impressive for a first step onto the market – obviously the engineering department has been doubly busy.

Aimed more at the beginner market, it's easy to setup, but most people willing to get into water cooling aren't beginners and already know their watery stuff. In which case, you're better off spending this kind of dough on a higher end kit. Regardless, going by overall performance this is a highly respectable debut unit from Corsair. However, being this expensive, it's outstanding in more ways than one.

SPECIFICATIONS:

External water cooling kit; cools up to 200W of heat; temperature warning alarm; PC-shutdown ability; sealed water pipes; LED temperature display readout.

SUPPLIER: Altech

WEBSITE: www.altech.com.au

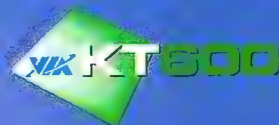
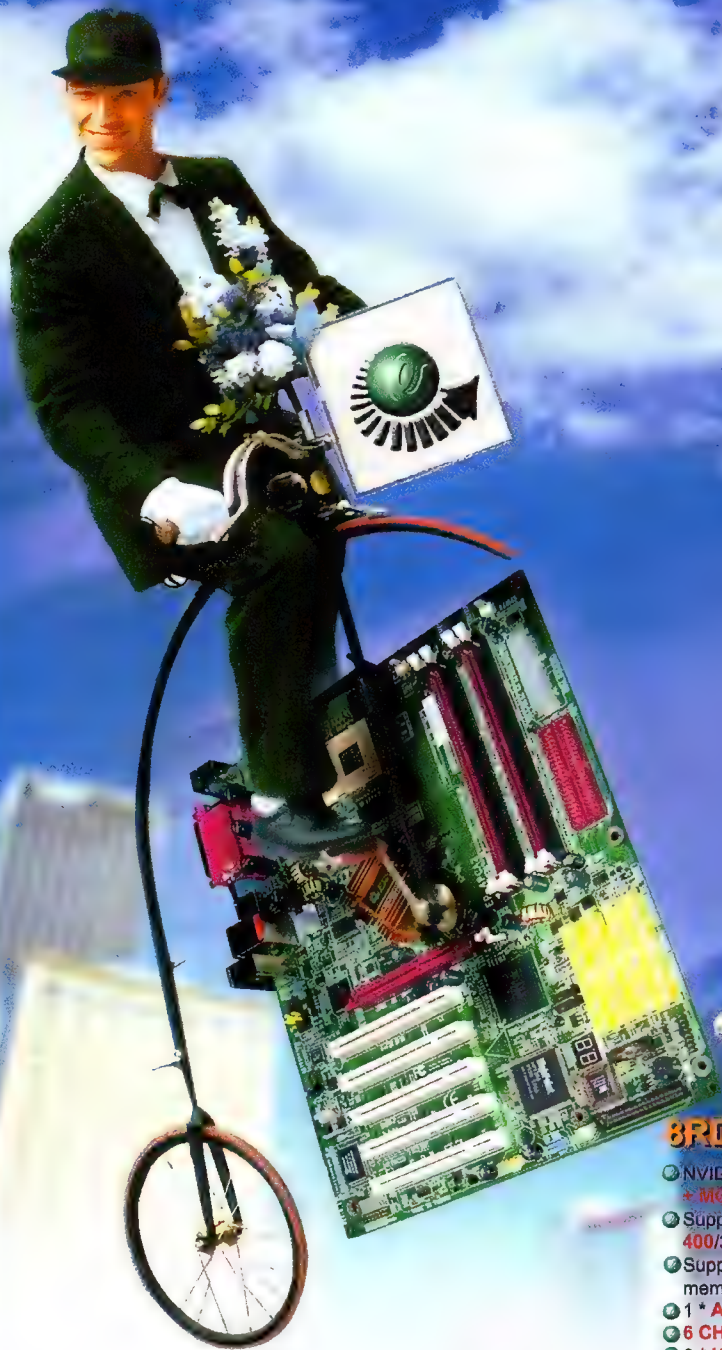
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PRICE: \$544

SCORE:

8.5/10

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- Post Port debug LED display ; Power BIOS



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Cooler Master - Wave Master



Whoa man, that's pretty trippy.' These were among the first words that fell out of our mouths the second we whipped this beauty out. The first thing of notice is the protruding section on the front. This juts out for the air intake and also has two LEDs positioned behind it, giving off a beautiful glow effect.

Cooler Master is well known for its impressive engineering, and this case is testament to that. Made from thick-brushed aluminium, this box has an

extremely clean and simple inner layout. It comes kitted with three 80mm case fans – two parallel intakes on the front and one exhaust on the back. On top of the case is a pop-up lid that contains a 'USB module' with pass-throughs for two USB 2.0 ports, a FireWire port, a mic line and a speaker line out. But forget that, this can be ripped out and replaced with the supplied 80mm fan mount – a far superior solution.

Sporting four 5 1/4in slots and five 3 1/2in bays (one external), there's space for the whole family. The one thing it doesn't contain is a PSU, but that's not unusual for aluminium cases with all the messing around with price inflating RF emissions approval. You can fit either a standard ATX or a

redundant PSU with the two included back panels.

This is a very solid, sturdy case, hardly budging when attempting to reconfigure its factory default shape. Both the side panels and the sliding mobo compartment are secured with thumbscrews, making life that little bit easier.

However, the sliding mobo tray requires a minor degree of force as the mounting screw threads underneath obstruct the glide path. This only partially detracts from the slick awesomeness of this case.

It isn't exactly inexpensive but this case is aimed at those who are prepared to pay more for a quality case. If you're after such a case, this beats the other's hands – and other body parts down – almost halving their price with all the neat features and impeccable build quality to boot. Oh, and it has a swanky magnetic front door. Yes, you must have it now. **ND**

SPECIFICATIONS:

All aluminium midi-tower; three 80mm fans; swappable USB/fan module; support for both ATX and redundant PSUs; four 5 1/4in bays; five 3 1/2in bays.

WEBSITE: Cooler Master www.coolermaster.com

SUPPLIER: Australia IT www.australiat.com.au

PHONE: Australia IT (03) 9543 5855

PRICE: \$253

SCORE:

8.5/10

Western Digital Caviar SE Serial ATA 250GB



We were promised early last year that by now, ribbon cables would be a rarity and everyone would be sucking data from the CRC-checked thin cable bliss that is Serial ATA. We still don't know what happened, because as the dust settled on the end of 2002 only Seagate had SATA drives were readily available.

This has changed slowly, and Western Digital is now delivering its second foray into the Serial ATA marketplace, following up its 10,000rpm small capacity Raptor drives with a certifiably big-arsed 250GB of space.

A quarter terabyte should be plenty of storage, even if it loses 18GB once the collision between marketing terminology and the reality of formatting hits. To sweeten this even more, the drive is part of WD's 'Special Edition' line; with 7,200rpm drive speeds and 8MB of on-drive cache.

We ran the drive through our standard series of hard drive benchmarks, more to ensure it performed to the advertised specifications than to expose magical benefits of SATA (for now the benefits of the new attachment specification are numerous, but mainly mechanical and thermal).

Thankfully the results matched expectations, the seek times and general drive performance did not vary greatly from those

seen with Parallel ATA connections.

This is due to the actual drive mechanics being the same between Parallel and Serial ATA models, all that changes is the connection method.

Western Digital has thought about the transition process, and as we are yet to see power supply units with SATA power connectors, it has added both SATA and Molex power plugs as a feature called 'Flexpower' (and it added a big warning telling you not to plug both in simultaneously for fear of nasty melting electronic smells).

Western Digital has yet again delivered a quality entry into the Serial ATA market. Sure, the drive costs a little more than the identically specced Parallel ATA model, but the advantages of SATA are worth the cash.

The future is here, SATA is a reality and WD has delivered a great product for riding the transition. **JG**

SPECIFICATIONS:

7200rpm; 8MB cache; Serial ATA connection; Molex and SATA power connectors.

WEBSITE: Western Digital www.westerndigital.com

SUPPLIER: Western Digital www.westerndigital.com

PHONE: N/A

PRICE: \$585

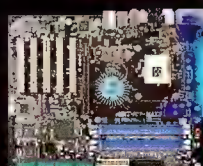
SCORE:

8.5/10



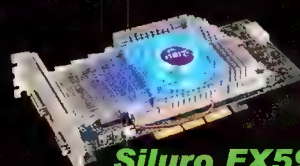
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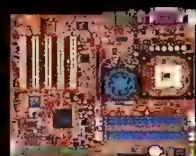
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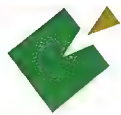


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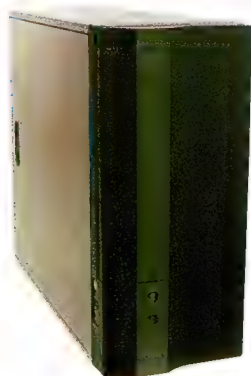
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Trinity X-21



Assessing the loudest PC used to inspire use of the 'phear factor' phrase. The respect has now worn thin due to said roaring monsoon boxes at LAN parties. Quiet cases are now so much more elite. With a name sounding like the *Matrix* version of a chick Terminator, it is actually a type of silent mid-tower case with sound absorptive and anti-vibrative rubber material attached throughout the innards. Noise silencing cases are sweet, but the

thought that you'll end up with a super-heater from all the padding more than detracts from the advantages.

This case looks quite the part. On the front it has a magnetic door in which a temperature readout resides and displays the heat levels of wherever you place the attached thermal probe. Behind this hides four external 5 1/4in and two 3 1/2in bays. Inside there are a further four internal 3 1/2in HDD bays and an additional 5 1/4in bay at the bottom.

With all the space and sound deadening bits, this black-coloured wonder is begging for some serious bench testing, *Atomic* style. We loaded it with ten fans including a 120mm behemoth, four screaming CPU fans, two case fans, an old noisy chipset fan and the PSU.

We flicked the switch, and a Sydney-wide power outage later, we were testing the decibel levels. The ambient noise in the room before juicing up was ~53dB. Inside with the spinning fans, the decibels were a screeching ~76dB – but when we closed the case, the noise level directly next to the side dropped a rather significant 17%, down to ~63dB. Of course, all the noise was gushing out the back, but to be annoying you'd need to be in its crossfire.

With all this greatness we found one possible problem with the air intake; nowhere near enough air is being sucked into the case. With no holes on the front, air is slowly drawn from the small opening under the front of the case.

For an otherwise beautiful case, the Trinity X-21 is a very good buy for \$175. If it weren't for the lack of a larger blowhole, this would be the perfect tower.

ND

SPECIFICATIONS:

Black steel mid-tower case; thermal readout display; magnetic door; two 80mm fans; five 5 1/4in bays (one internal); six 3 1/2in bays; sound reduction material; anti-vibration pads for fans/PSU.

SUPPLIER: PC Case Gear

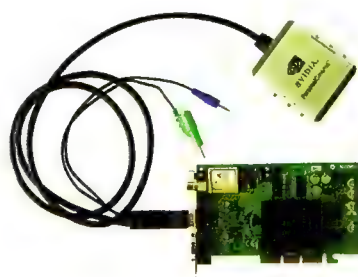
WEBSITE: www.pccasegear.com.au

PHONE: (03) 9568 0932

PRICE: \$175

SCORE: 8.5/10

MSI Personal Cinema



Watching TV on the PC has become quite popular among many of our fellow geeks – even spilling into the general retail market. MSI's Personal Cinema is the first of its kind in Australia. It isn't exactly your very own IMAX theatre, but it's

another of those video convergence cards, with wonderful tiddlies like TV and DVD capabilities and video in/out.

Installing the GeForce FX 5200 card takes a decent amount of effort with many PC cases, as the TV-in plug is in a slightly awkward position. Relying on passive cooling this card tends to get a tad hot at times, but seems to handle this fine. If you already have enough hot items in place, you may want to invest in a replacement HSF.

Normally we wouldn't mention installation of the software, but these two discs are evil itself. As soon as you shove a CD into the drive, the install begins and completes with no prompts at all. Luckily it prompts for a restart, but that's it. Great for newbies, but horrific for the rest of us.

After the attack of the CDs, the TV tuner actually provides some quality viewing, with a full-screened telly barely showing any loss in quality. TV sound is also riddled with impeccable

goodness, with just pure crisp audio. Like any other it also supports recording, and it does a great job of it too, encoding files in the MPEG format. Of course, you'll want to re-encode these to something more compressed like the ever-popular DivX. Much of the supplied software can be a little obscure to use – if their interfaces were tweaked to a more logical design, reading help files wouldn't be necessary.

The remote control, looking rather familiar, has the good measure of controls on it, along with RF support. This is the same controller that the RADEON ALL-IN-WONDERS come packaged with. We guess this has to do with the 'why fix something that's fully functional' train of thought.

Overall, the Personal Cinema provides top quality TV displayage and is perfect for the mini multimedia PC. Aside from its foibles, if you're after a budget video card with impressive TV capabilities, this won't fail to impress.

ND

SPECIFICATIONS:

GeForce FX 5200 128MB video; TV tuner; video/audio in/out breakout box; RF remote control.

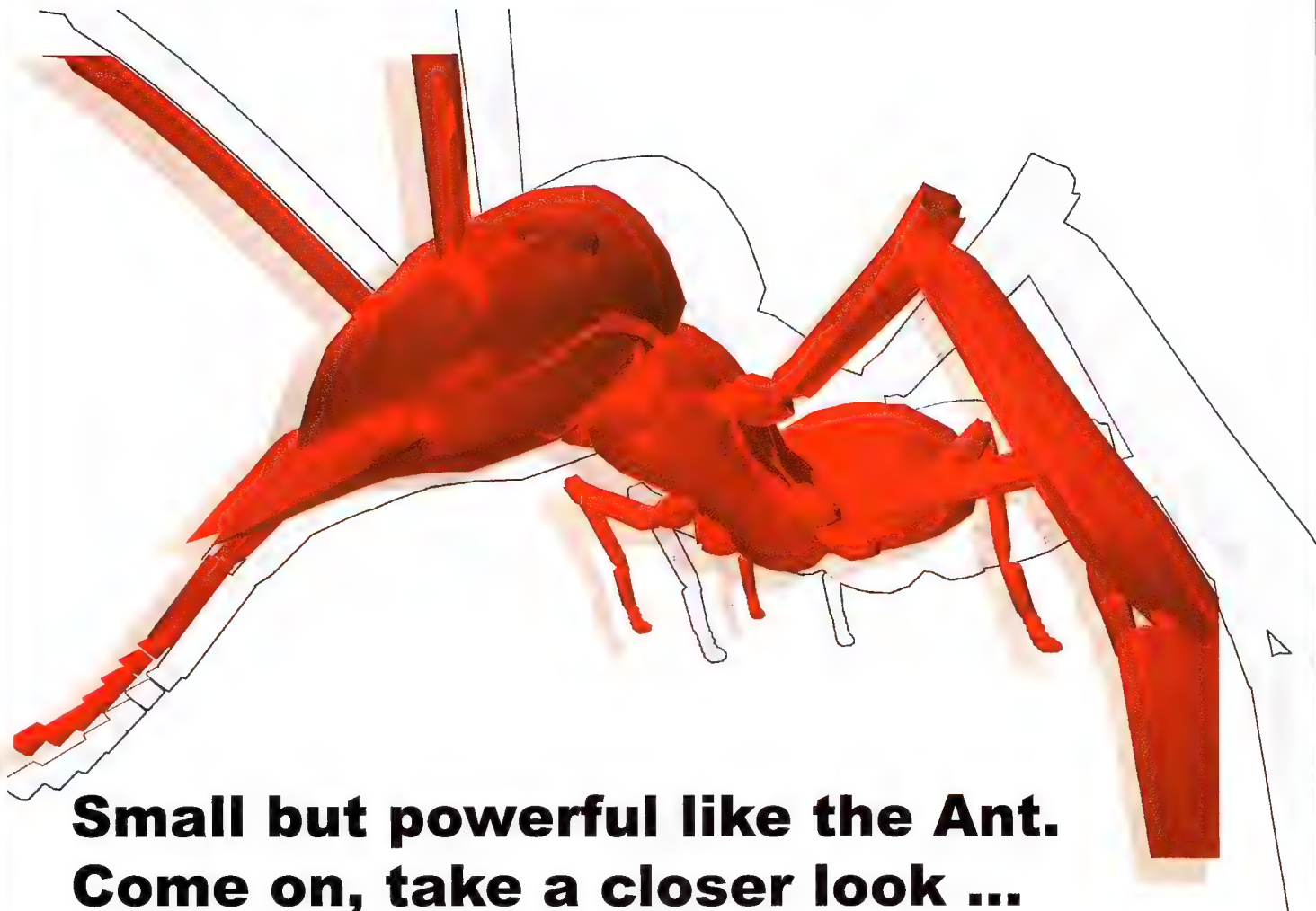
WEBSITE: MSI www.msi.com.tw

SUPPLIER: MSI www.msicomputer.com.au

PHONE: MSI (02) 9748 0070

PRICE: \$TBA

SCORE: 8/10



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transcendent 'appeal factor'. Little wonder any signs of ET life avoid us. With equipment like this internal water-cooling kit, they fear *they'll* be on the receiving end of the probe.

Construction of a water-cooling apparatus requires guts – so in we went. After assembly there was one slight problem. The clip on the tubing connecting the pump to the radiator seemed to be made of a titanium/diamond alloy, not budging even with large pliers. This required John's muscularity, but not even he could wrestle it into submission. In fact, with his powerful aid, the chunky pliers exploded. Of note, we recommend you apply some silicon around most connections before plugging them in, as there was the occasional leak problem on the radiator intake.

The 120mm fan's speed can be adjusted for either 7V, being very near silent, and 12V, emitting a serene hum. The loudest (yet barely audible) part was the pump. Of concern is how the fan's attached, blowing in the opposite direction of the radiator. This isn't right, so a re-reversing is recommended for better performance. Mind you, the four screws were a tad difficult to

remove because of their awkward position.

We had the WaterChill wage cooler-combat on the same specs and heatsink as those on *page 60*. Supporting both the AMD and Intel platforms, you'll have more luck with an Intel system, as all boards require mounting holes – of which the majority of AMD boards don't have.

Again, room temp was a steady 22°C. With the fan running at 12V, thrashing the CPU in SiSoft Sandra returned a very respectable 37°C, with the slower 7V increasing to 47°C. While in idle mode, 12V dropped to 35°C, but 7V showed a significant drop to 37°C. With the radiator capable of removing up to 400W of heat, we can see this going a long way.

Obviously aimed at the hardcore market after serious results and definitely not for the faint at heart – but hey, you're reading *Atomic* after all.

ND

SPECIFICATIONS:

Socket 478/A/940 CPU water-cooling kit; 400W heat-removal capable radiator; 120mm radiator fan; 'Plexiglass' reservoir; full copper waterblock with windowed top.

SUPPLIER: PC Range www.pcrange.biz

WEBSITE: PC Range www.pcrange.biz

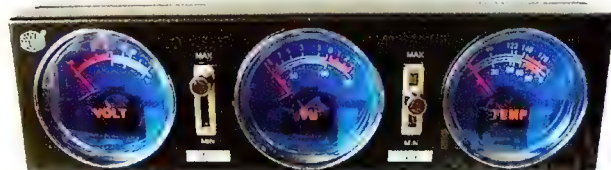
PHONE: (08) 8322 9544

PRICE: \$389

SCORE:

9/10

Cooler Master Musketeer



With the craze of mixing the old with the new now in full swing, we have here another funky object that merges the analog look with digital style – of course, fully equipped with blue LEDs. But this isn't *just* another gadget. Honest.

The Musketeer isn't French, and it doesn't contain in-built peashooters that whip out and shoot stuff in a moment's notice – sorry to rupture your dribbly bubble. It makes up for this by having its dinky innards fully encased within a slick black metallic box providing three analog gauges for an oodley dollop of monitoring goodness.

The first gauge is for the voltage control of the fan (yes, only one fan). Sitting alongside is the actual lever to adjust the supplied juice. As with any fan controller, this either increases or decreases the level of noise to be had, depending on the level of pain your index finger wishes to inflict upon your upper anatomy.

The voltage level ranges from 6V up to a max of approximately 10V. This may pose a problem for when you wish to operate the fan at full speed. Our Volcano 6 Cu+ reduced to 6,026rpm at top speed on this – a drop of 12.5% from 6,887rpm. There is, of

course, a noticeable reduction in noise.

The next gauge is for sound, and no, this is not for measuring your fan's incredible barrier breaking abilities. This plugs into your sound card's 3.5mm line-out jack (via a PCI bracket) and monitors the decibel levels – between -20dB and +3dB – which can be adjusted. Screw listening to music; sing along to an orange boogying pin. Oh yeah.

The last circular display shows the temperature, between 10-90 degrees Celsius, of any device you care to probe with the thermal sensor.

The manual was a little obscure, but setting up was reasonably straight forward – just free a 5 1/4-in drive bay, secure it in place with the supplied screws and plug in the bits.

All for three and three in one – hurrah! The Musketeer is definitely something worthy of adorning your box. Now, if you'll excuse me, my eyes are experiencing orgasmic side effects.

ND

SPECIFICATIONS:

Voltage, sound pressure and temperature displays; adjustable voltage DC6 to ~11V for one fan; adjustable sound sensitivity VU -20 to +3dB; temperature 10 to 90 degrees Celsius.

Website: Cooler Master www.coolermaster.com

SUPPLIER: Australia IT www.australiait.com.au

PHONE: Australia IT (03) 9543 5855

PRICE: TBA

SCORE:

8.5/10

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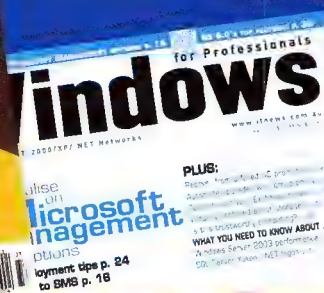
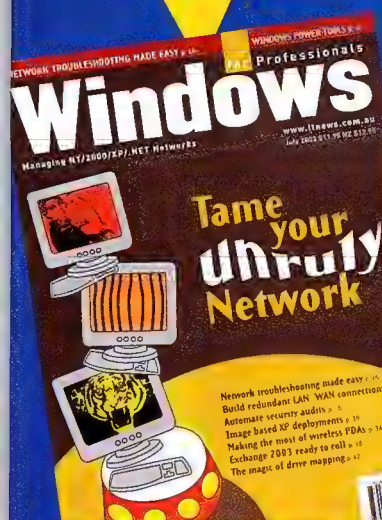
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ATO SEP 03

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String, dots and sticky lumps

Nathan Davis can't stop playing with his aiming thinger.



It's a clear dark night and the cicadas are chirping furiously. Swiftly, you activate your night vision goggles, and spot a prime sniping position. Equipping yourself with a Desert Eagle, you surreptitiously jump from the tree you were perched in and creep your way over to a large, partially moonlit, three-story building. Suddenly you halt in your tracks. Above the ear-dicing noise, you hear a repeated crushing sound to your right. Instantly you drop to the ground and spin to face the noise, ready to let loose some lead flyin' whoop-arse. An enemy casually walks forward and appears directly in front of you. Unaware of your presence he almost walks on top of you. Slowly, you take aim. . .

I love all types of games, but first person shooters are great for the realism factor – they can induce fear and much sitting on the edge of seats. Realistic, that is, apart from one small object. Without it, shooting would be so much more challenging. I'm referring to the humble little dude that's almost permanently stuck in the centre of your screen; that much neglected, but entirely necessary crosshair.

It's something that hasn't had the privilege of being mentioned much at all, let alone enjoy being the centre of conversation. It's extremely small, and hasn't had any major update since its original incarnation. But that's the beauty of it – there's been no need to change it – it's just too plain perfect. Sure, it's been adjusted with the times, from a blocky sprite to a fully antialiased vector. It's even gone through a groovy 3D stage (Alien vs. Predator), but it still

remains the same basic object.

Unfortunately the humble crosshair has come under attack. In a bid for a different gameplay feel, some developers are slowly having it disappear from games. Of course, there is a way around this. Bubble gum is a sticky substance for good reason after all.

People are only going to put other objects in its place, so why make us spend money on sticky stuff we would rather see cursed off our screens. Sometimes desperate times call for horrific measures, even if our precious monitors weren't made for sticking goopy bits on them. The crosshair belongs smack in the centre of our screens, and I say leave it right there.

The death of the humble crosshair will come when true simulated gaming comes to light. Not only will this be an exciting time, but we won't require the crosshair any longer. 'What the heck – you had me sold?' you yell. Well sure, I love my crosshair – but only with today's current tech. Who wants a pesky dot flying in front of them when they're in a simulated 3D world? It'd be worse than wearing a fishing rod on your head with a chunk of food attached on the end for encouragement. At least there's a chance you can eat that. Being assimilated by computers is a long way off yet, but you can prepare by getting all excited and prance around the room doing the nekkid dance.

Tracking back to the beginning of the crosshair, the history of this magnificent creature is extremely hard to get a hold of. One of the first known uses of such a guide on the PC was rather primitive, as

are most original ideas – but it worked a treat. In a major Doom competition (the original game with no crosshair), a guy once used a length of string vertically attached to the centre of his monitor for aiming accuracy. Whether or not he won doesn't concern me – this was truly an elite idea that only grew to become fully mainstream. It changed the path of which the FPS took – gameplay is now more focused on actually killing the enemy, not hoping you'll hit them.

Learn to adore your crosshair for what it is; it really deserves far more appreciation than what we currently give it. That diminutive, almost pathetic-looking little dot on your screen represents a large part in all that is good in FPS gaming. The massive following of this style of gameplay probably wouldn't be anywhere near the size it is today if it weren't for those few fancy pixels. It does a wonderful job of locating the centre of the screen for you, and it's simple yet effective; the crosshair confirms this phrase ten times over. Of course for innovation's sake, some even move a tad to give you a better idea on what you're aiming at. Respect for the little crosshair – and the cool guy who dared to attach a length of string to his monitor.

KEY

PS2

PC

GAMECUBE

XBOX



Artomic
OldSkoolFool by Adrian 'AsterOne' Tofoni

The piece can most accurately be described as a collage, images were sourced from MAME screenshots, Google image search and a few scanned bits, all these were then put together and touched-up using Photoshop's ugly cousin, Jasc's Paintshop Pro 8. Over 75 different images make the complete piece.

Create the winning Artomic and win the latest version of Photoshop Elements and Photoshop Album from Adobe! Email a preview (no larger than 5MB) of your games or hardware-themed masterpiece to artomic@artomicmpc.com.au.



SHORT CIRCUITS

Infinium Labs' all broadband 'Phantom' console is set to launch on the 17th of August with a simultaneous unveiling at Phantom.net and InfiniumLabs.com. Unlike the current consoles, the Phantom won't have an optical media drive but will rely purely on broadband to distribute its games and media. Not only will the hardware be based on PC parts and Windows XP, the console will be fully upgradeable. The company claims that it will 'outperform Xbox, PS2 and GameCube.'

It appears even Carmack isn't as bulletproof a geek as he's made out to be. Doom 3 has been delayed to early 2004 according to the latest conference call at Activision. To make things worse, Trinity and Quake 4 have also been pushed back. We won't be seeing the new BFG until the second half of 2004.

Sony has released the first PalmOS-based PDA with OpenGL support. The PEG-UX50 CLIE uses Sony's new 'Handheld Engine' CPU and includes gadgetry such as: digital camera, voice recorder, IrDA, Bluetooth and Wi-Fi. With a high-res colour screen and OpenGL loaded, this CLIE is set for mobile gaming – could this be the prelude to PSP?

BUZZWORDIKAH:

Fragment shader

'Fragment shader' is often used in place of 'pixel shader.' Whereas pixel is a much broader term for any picture element in the pipeline, fragment is a term usually reserved for the pixels formed after scanline conversion has taken place. This is toward the end of the pipeline where everything is converted to 2D for display.



SCANNER

Super shading

Subsurface scattering – the difference between an ugly face and a beautiful woman. James Wang takes a look at the finer points.

With so many games today using pixel shaders, it's about time we flesh out just what exactly is a 'shader'.

Previously we've only talked extensively about this technology with regards to hardware, but shaders aren't hardware. They are not really software either – so, what are they?

A shader is a model for a material. Materials are the visual stimuli you don't find interesting in real life but find exhilarating in games. Glossy marble, wrinkled paper, rosy skin – every surface can be thought of as a material. Because we seek to reach perfect realism in 3D graphics, we need methods to simulate such material within the graphics processor. As computers speak the language of mathematics, we need mathematical models of real life materials. Hence a shader is a computer's model for a real life phenomenon.

With this new mindset in place, it's clear the first step in implementing a shader is understanding the physics behind materials in our world. The number of variables required to describe a shader is a measurement of its complexity. Mirrors only take two variables: the direction of the viewer and what stands in the path of the reflected ray. Marble would need a base texture as well as a reflective component. The addition of lighting at this state would introduce the other components to simulate the marble material, namely specular and diffuse variables. This gives it the appropriate glossy and slippery look.

Of course, shaders in games didn't start off this way. In the beginning, there was only one shader. Single texturing meant that walls had the same look and feel as metal or water. As technology advanced, so did the gap between the rich and poor. Brick walls remain single or dual-textured, but metal, marble and glass have advanced. At this time, things started to look 'gimmicky'. Certain parts of the game looked good while others were dull (UT, Quake 3 era). Moving into the DX 8 timeframe allowed almost all things to look gimmicky; a brick wall can even be bump-mapped and lit with different light components. But the disparity continued to increase, with shiny balls getting shinier and water looking sexier by the ripple. This trend is likely to continue for the next generation.

This disparity exists because we have found reasonably good shaders for much of today's content; we are at the stage where anything opaque can be drawn convincingly.

Take NVIDIA's rusty truck demo at the launch of the NV30. Essentially, it showed a truck change the colour of its paint with the passage of time. Once again the real world problem – how does paint age with time? To begin with, NVIDIA had to obtain data from Brown University on its studies on paint aging. With this data in hand, they went ahead and modelled the paint to an approximate shader for simulation on their GPU. The point



ABOVE: Without even using real subsurface scattering, one can cheat and get some excellent results. All you need is a plain texture and some spectacular highlights. And a bit of colouring.

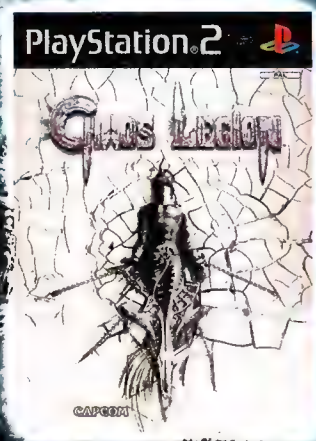


'tis the darkest Glyph thou barest.

it sacrifices stray souls to summon unearthly force.

Unearthly force shall obey and serve thee. 'tis named CHAOS LEGION -

The Apoerypha of Yzare 23: 4



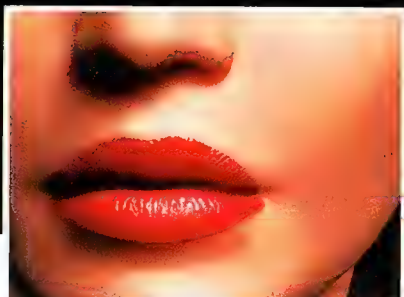
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Available September

PlayStation 2

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ABOVE: Marble using subsurface scattering.



LEFT: Human skin, again with subsurface scattering. The top render uses BSSRDF, while the one below uses BRDF. BSSRDF looks more realistic as light travels 'through' the skin.

is many materials still require our understanding first before we can attempt to model them.

One such shader is the human skin. To have 'perfect skin', we need to know every variable that is affecting it. But we simply don't have this knowledge or a model that comes close to simulating it. Most game characters are still texture maps.

Unlike a solid opaque surface, when light hits skin, it not only penetrates but scatters randomly in all directions. The photons scattering beneath the skin lights up our tiny blood vessels and gives a soft pink glow. A traditional model that doesn't take this into account creates skin that is solid and lifeless. For a skin shader, subsurface scattering is the most essential element. A more accurate model also accounts for the passage of light through the silhouette of the object. For example, when you stand in front of the sun, light literally passes through your skin and this is most visible at the outline of your skin. This component known as 'sheen' is used in conjunction with scatter shaders. Together with other components which account for the oil and the micro-bumps on your face, a good skin shader can be modelled. One such shader that incorporates all these factors was introduced at Siggraph 2001. But as you can see even today, few games have endeavoured in this area. One notable exception is Delta Force: Black Hawk Down, which used an oil map for its characters. Check it out if you get the time, it's one of the few games to have put some good pixel shaders into use. **JW**

DEVELOPER QUOTE OF THE MONTH:

(When material style shaders will replace multitexturing. . .)

'On the advanced materials, I think once we get rid of this DX 6-style multitexture, we'll be there. I'd guess in about two years we'll be pretty much completely rid of those, and the dominant standard will be VS2.0/PS2.0. A lot of it is up to when we get PS 2.0 to low-end and to the integrated graphics solutions, unfortunately.'

Markus Maki, Development Director - Remedy Entertainment

Would you like a physics engine with that?

There was a time when making a game meant you had to write the graphics engine, the sound engine, the physics engine, animation systems, build your own levels, texture your own maps and do everything right down to the last bolt - but no more. These days, there's a middleware company to cater for all the possible hassles in making a game. Is this the way future games are going to be made?

Some developers have changed their business. A lot have in fact. They've repositioned themselves as consultants and assist other studios for all things game-related - from content creation to online documentation. The number of companies for outsourcing game expertise has exploded in recent years.

Liquid Development (not to be confused with Liquid Entertainment) claims itself to be 'The Only Art Resource You Need.' It has handled all artwork from character design to building entire levels. With titles such as Ultima Online, Mechwarrior 4 and Enter the Matrix under its belt, this company is one of the hottest on the block.

AI not working right in your game? Call up BioGraphic Technologies. Its AI.implant middleware interfaces directly with your game engine. Once the engine updates AI.implant with events and state changes, it directly translates these into actions and animations for characters.

When it comes to physics, Half-Life 2 has set the standard. The game mechanics and physics have flexibility we haven't seen in any title to date. But is it really the Source engine at work? I was shocked to find all the amazing dynamism in HL2 is courtesy of Havok's physics engine. Early in the development of HL2, Havok was incorporated as HL2's dynamics engine and for the past three years, both companies worked closely to refine the system.

But who needs all these pieces when you can get a working system with sound, AI, physics and netcode from id? Quake, which Half-Life was based on (not Quake 2) has been available free under the GPL licence since 1999. Licences such as this allow you to make your own games based on the engine, sell it and turn a profit without handing a dime to id Software. But by the nature of the GPL licence, you have to make your source code available to the public and can not keep anything 'proprietary'. For a breezy US\$10,000, you can purchase a 'non-GPL' licence for Quake and keep your game propriety.

But of course, you want the Quake 3 engine. id takes so much pride in its jewel that it's actually limiting the number of licences it will grant. It's its way of protecting existing customers and maintaining Q3's exclusivity.

As if the whole engine is some kind of six-star Hotel package, the licensee is treated to a 'one-time, full-day, question and answer session with John Carmack' and 'information session on level design and shader construction with one of the level designers.' And it'll only cost you US\$250,000. . . **JW**

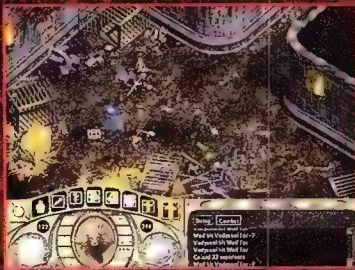
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Just as a single pencil in the hands of a skilled artist will produce breathtaking beauty, a full palate of oil colours given to a layman will yield nothing – a state of the art game engine may produce a visually devoid game, while a less competent engine, in the hands of a skilled team, will yield a visceral sensation. Once in a while a rare emergence occurs – a gifted developer coupled with ground-breaking technology. It's then that something truly marvellous is created.

Of the many graphics engines out there, X-Ray is one of the lesser known. It's the pillar behind the better known S.T.A.L.K.E.R. game. It's taken over two years to create entirely in-house, and has given developers maximum creative freedom. Based on DirectX 9.0 technology, all of the DX 9 shaders used are written in Higher-Level Shading Language (HLSL). When given the choice between DX 8

Designer on S.T.A.L.K.E.R. said. But HLSL still needs further work, 'there were occasional mistakes in the compilation,' he added.

When asked what they view as major factors that distinguish between next generation engines, realtime shadows was high on their list. Doom 3 has perhaps the most consistent lighting and shadowing but the X-Ray engine has its own advantages: 'With the DirectX 9.0 renderer, we've implemented fully realtime dynamic lighting, soft (unlike Doom 3), physically correct shadows (again unlike Doom 3), cast by every object onto every object, along with true per-pixel lighting (Doom 3 uses per-texel),' Shishkovtsov explained to us.

The lighting engine while not totally unified (it still uses radiosity-generated



shadows in the open and appropriately sharper and distinct shadows in dark enclosures. From the footage we've seen, the indoor environment has lighting that comes close to Doom while outdoor scenes rival that of Half-Life 2 (minus the water). Isn't this what we always wanted?

Built with today's high-end GPUs in

S.T.A.L.K.E.R. OBLIVION LOST

Deep inside the former USSR, near the Chernobyl exclusion zone, James Wang suffers a nasty dose of exposure to X-Ray.

shaders or DX 9 HLSL using C-like syntax, the choice was a no-brainer: 'HLSL gave better results in terms of code optimisation. Compared to assembler, it is way faster,' Oles Shishkovtsov, Lead

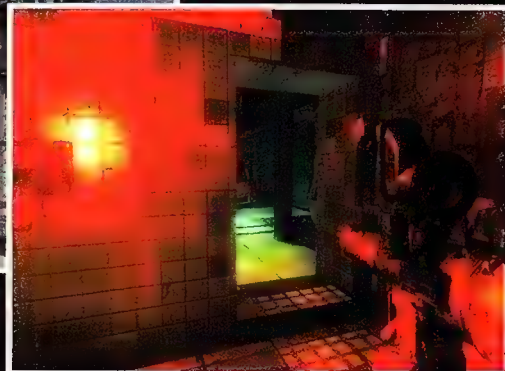
lightmaps), is cleverly designed. Whereas Doom 3's razor-sharp stencil-based shadows are effective only for closed areas with a few lights, X-Ray uses a hybrid lighting system that generates soft

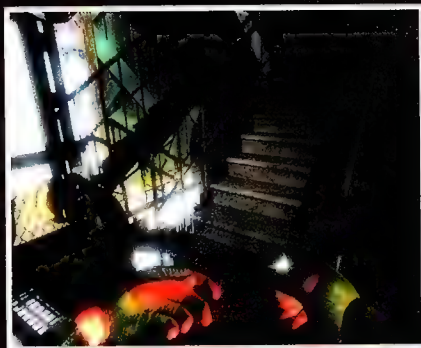
mind, the engine produces between one and three million polygons per frame. With most of today's games using six-digit geometry figures, this leap requires some neat optimisations. One is the use of a



ABOVE: One of S.T.A.L.K.E.R.'s outstanding achievements is the use of high resolution textures from photographs taken during research in the areas around Chernobyl.

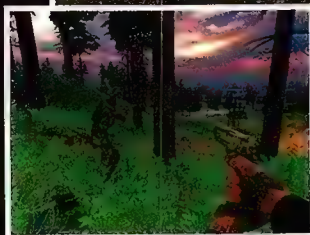
RIGHT: The wall demonstrates the use of shaders for texture and lighting effects.





portal-style visibility determination system.

In any 3D scene, objects will overlap each other, producing overdraw. Visibility detection algorithms are used to determine which pixels are drawn and which are occluded. Carmack evangelised the BSP/PVS algorithms with the Quake series of engines. This was ground-breaking in its time but didn't perform optimally for outdoor environments. An opposing school of thought proposed a 'portal' algorithm.



ABOVE: Some of the finest texturing in game history **LEFT:** The lush environments even stretch to authentic undergrowth foliage **LEFT ABOVE:** Shadows in S.T.A.L.K.E.R. stand out from the crowd due to their softness and subtlety



S.T.A.L.K.E.R.'s focus on huge outdoor environments needed a highly capable visibility system for outdoors and hence was built using the portal algorithm. It uses fewer resources than BSP and general performance is higher.

For open areas, dynamic level of detail (LOD) is desirable. Black and White was one of the first titles to heavily depend on geometry LOD. However, with today's GPUs spitting out polygons at astronomical rates, many developers are throwing away LOD: 'We rejected using LOD for static geometry as it didn't justify itself in terms of speed. It's faster to render more geometry in buffers already in video memory than calculating indexes first.'

But as with all engines, there are compromises to be made. We've talked extensively about the benefits of normal mapping to enhance low lying geometric detail but this didn't make it into S.T.A.L.K.E.R.. '[Normal mapping] greatly slows down the performance and means a lot more work for the artists. We did consider it, but for DX 9 render only.'

But the secret to S.T.A.L.K.E.R.'s stunning visuals isn't shaders or geometry,

rather its meticulous art direction. The growing technology has placed a burden on artists unlike any we've seen before. More often than not, games are designed with too much emphasis on technology and little direction in creating atmosphere or tension. I still challenge anyone to create a scarier monster than System Shock 2's 'hybrid' – made from a mere 180 polygons.

Many modern designers have fallen into the trap of making games to showcase technology. S.T.A.L.K.E.R. is different in that it focuses intensively on creating atmosphere – the essential glue to gameplay lacking in today's games. To recreate the post-Chernobyl area where the story is based, the design team undertook two field trips to Chernobyl and digitally recorded much of the architecture, remains and textures.

The textures in S.T.A.L.K.E.R. are frighteningly real. No road is left uncracked and no armour unscathed – even the finest details are painstakingly reproduced. To avoid the loss of detail when viewed closely, detail maps are generously applied to much of the environment.

The game architecture is chilling in its

presentation – worn out, dilapidated and on the verge of collapse. In the open, industrial complexes and housing blocks constructed in the communist era stretch across the foggy horizon. Step inside into realistic lights with soft shadows.

To further emphasis the sporadic and grim regions surrounding Chernobyl which has been dubbed – 'The Zone', the X-Ray engine will display another one of its gems: 'We will be using various post process effects in-game to indicate areas of anomalous activity, which is an integral part of our gameplay.'

Post filters are effects applied after the entire frame is rendered – much like a Photoshop filter. They indiscriminately affect the entire frame and are useful if you want to convey a certain tone or change in colour properties. With programmable fragment (pixel) shaders, you can effectively apply many Photoshop effects in real time. In S.T.A.L.K.E.R., these effects are used to alter the player's perception.

Next month, in the second part of our X-Ray dissection, we'll delve into the other three engines of the game: sound, physics and A.I.

JW

Microsoft Flight Simulator 2004: A Century of Flight

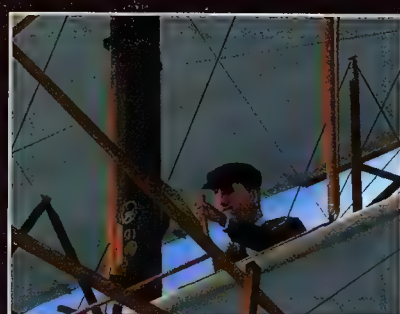
Des McNicholas is flying high after blazing through the skies in Microsoft's latest sim.



If we could make it there – we'd make it anywhere! Yes we would.



The Comet is the sexiest plane in the world, ever, but it flies like a lobster in a bucket.



Orville Wright wrestles with the fact that he's suddenly appeared in Alaska in 2003.

Debate still rages about Wilbur and Orville's claim to fame, but this year is generally accepted as the centenary of powered, controlled flight. The 12-second, 37-metre hop at Kittyhawk – flown by a prone Orville Wright straddled across his flying machine – heralded a new age of adventure that saw pilots from around the world seeking fame and fortune by flying higher, faster and further. Microsoft recaptures that excitement in a new version of its remarkably successful Flight Simulator, with a combination of flyable historical aircraft, new adventures based on the 20th century's greatest feats of aerial endurance, and a revamped flight engine that clearly shows the difference between seat-of-the-pants and fly-by-wire aviation.

Those without an historical bent will be just as pleased with Microsoft Flight Simulator 2004: A Century of Flight, because Mr Gates hasn't forgotten the millions of fans that grew up on the franchise's well-founded reputation for recreating the environments, black boxes and systems that define the modern pilot's world. Century of Flight doesn't look like a major step-change on the surface (and it certainly isn't in some areas), but it's far more than a simple cash-in on the Kittyhawk anniversary. This year also marks Flight Simulator's 20th birthday, and Microsoft has celebrated by tweaking most aspects of the game.

The strength of Flight Simulator's online community arguably means that the number of flyable aircraft in the box isn't that important anymore, but Microsoft has still delivered on

some terrific new planes and enhanced old standbys like the Lear Jet and Cessna. History's classics include the original Wright Flyer, the famous Ford Tri-Motor, the outstanding deHavilland Comet (pick of the bunch) and the venerable DC-3; supported by more recent designs such as the Boeing 737-400, the Beechcraft Baron and the Schweizer SGS Sailplane. It's an outstanding mix that opens up a host of new opportunities and experiences for desktop pilots, and one that should spawn a stack of new mods for years to come.

Microsoft has done an excellent job with the exterior design and artwork on the older aircraft, and the attention to detail has been carried through to areas such as retractable undercarriages and movable surfaces. The introduction of a new 3D virtual cockpit option makes things look just as good on the inside, and players will welcome the opportunity to directly toggle switches and turn dials – which is all the more exciting when struggling along without modern flying aids. The disappointing lack of any real attempt at period settings (airfields, cities etc.) detracts a little from the atmosphere, but it doesn't really affect the flying experience.

Microsoft's in-flight entertainment is better than ever, thanks to excellent flight models in the historical aircraft that strike a neat balance between the demands of flying a wooden box without ailerons and the generic realities of a simulator that tries to cover so much. Some of the modern aircraft seemed to have been tweaked as

well, and the massive revamp of the weather system brings further improvement over the already solid Flight Simulator 2002 experience. The new three-dimensional clouds look great, the weather patterns seemed far more realistic over long distances, and the introduction of optional weather themes adds an extra level of interest and simplifies flight setup considerably.

Veterans will welcome the game's unquestioned focus on realism, from the air traffic control (ATC) system to the comprehensive flight planning elements, but Century of Flight also continues Microsoft's recent efforts to attract new fans. John and Martha King are back with their homespun introduction to the joys of flight, supported once again by Rod Mochado's flying school and full online documentation. A new Web-style Learning Centre covers just about everything a new pilot needs to know, and the improved flight analysis screen supports detailed post-flight reviews. None of it makes up for the lack of a paper manual though.

Microsoft Flight Simulator: Century of Flight does a great job of honouring aviation's past while providing yet another glimpse of simulation's future. More importantly, it's by far the most fun of the whole series!

SCORE:

8.5/10



GAME DETAILS

REQUIREMENTS: 450MHz processor; 64MB RAM (128MB 2000/XP); 1.8GB HDD; 8MB Direct3D video card.

RECOMMENDED: 1.4GHz processor; 256MB RAM; 64MB video card.

DEVELOPER: Microsoft Game Studios www.microsoft.com/games

PUBLISHER: Microsoft www.microsoft.com/games

DISTRIBUTOR: Microsoft www.microsoft.com/games

PHONE: Microsoft Games (02) 9870 2200

Outstanding aircraft models; remarkable depth; and a great range of options.

Still no paper manual; the ground scenery doesn't seem to have been improved; and some players will still find things too complex.

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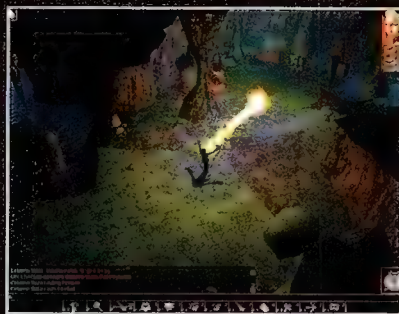
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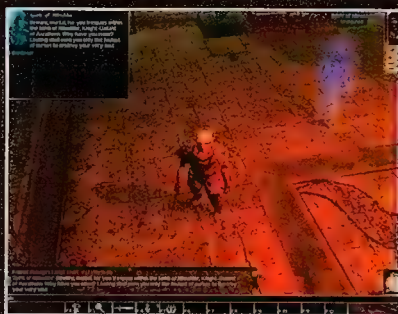


Neverwinter Nights: Shadows of Undrentide

BioWare may have muffed the critical, but DM Logan Booker is satisfied with a hit.



If you look closely, you'll see this lovely lady has a lovely arrow in her lovely, er, chest.



Plenty of new quests to get into, as Dellis the Dwarf quickly found out.



While the new tilesets are pretty, there's a lack of plant life and other 'expected' stuff.

Developers can't take a half-arsed approach to CRPGs when so many elements need to be combined to create a beautifully-woven masterpiece. While running around as a guy named Ryu with a magic sword his father gave him can be 'entertaining', it's hardly engaging, and his quest to slay the dragon (or become one) isn't one that'll stand out in your list of greatest achievements.

For this reason, it's good to know there are developers like BioWare that are more interested in crafting great games with deep plots and charismatic NPCs than banging out 'different', yet disturbingly similar titles. To date, BioWare has yet to release a flop – even though the original Baldur's Gate wasn't everything people had expected – and this is the same with its expansions. However, they've never been fantastic, and this trend continues with Shadows of Undrentide.

Those after a CRPG that closely follows the 3rd Edition ruleset for Advanced Dungeons and Dragons will get the most from this expansion. SoU adds a lot of content that should have been in the original game – basic spells, a bunch of feats, skills and prestige classes. More on these later.

For the hardcore hack-n-slash CRPG player who's never touched a character sheet or held a d20, there's less incentive to pick this sucker up. And here's why.

SoU contains a standalone campaign.

You start out as a senior apprentice to a wizened dwarf named Drogon in a town called Hilltop. After a short introduction to a couple of new features, you're thrown straight into the story, as the old dwarf is poisoned in his own home by kobolds. The tale emulsifies.

After this, things pick up and you'll have plenty of people to chat to and dungeons to crawl. Dialog choices are like those in the first game and you can be as good or evil as you want; though you'll need to play nice now and then to keep the story moving.

The expansion is also designed for 1st-level characters. The level limit of 20 hasn't been removed, so forget about importing your old NWN character. You'll need to start a new avatar to get the most from SoU, and this will turn away players looking to continue on with their 'super' heroes.

If you do persevere with a new character, there's much to enjoy. The range of new spells is a godsend and includes Bigby's selection of damaging fists, the awesome clerical inflict wounds spells and True Strike, a staple 1st-level spells for magic user/fighters. There's also a great choice of new feats and skills, mostly made-up ones by BioWare, but there are a few, such as the skill Tumble and the feat Divine Might, which make the transition from paper to 'puter. There are even a few infamous prestige classes, such as the Arcane Archer,

poorly balanced for pen-and-paper but reworked well for SoU. As mentioned before though, it's all things that should have been in the original.

Graphically, SoU changes little; however, the new creatures look more natural and 'rounded', and their animations are very fluid. With all the detail up, NWN is still nice, if a little spartan. This has more to do with the new tilesets than the engine.

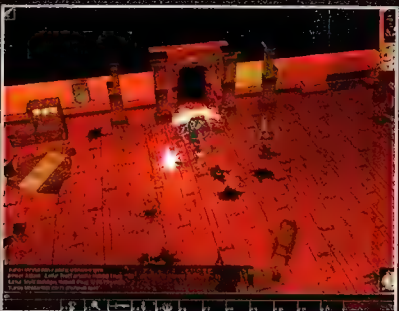
Complementing the prettiness is some good voice-acting, a variety of new, crisp sound effects, and a fresh heart-trembling music score, the quality of which is on par with Morrowind and Arcanum.

In the feature department there are no huge changes. The henchman system has seen tweaking; you can now equip your party and determine how they level, but other than this SoU plays identically to NWN. This goes for multiplayer as well.

While Neverwinter Nights: Shadows of Undrentide is solid, it 'adds' more than it 'expands'. It won't please those after more of the original story and their characters, but it will satisfy dungeon masters and those after more of the same.

SCORE

7.5/10



GAME DETAILS

REQUIREMENTS: 450MHz CPU; 128MB RAM; 600MB hard drive space; DirectX 8.1; 32MB TNT2-level video card.

RECOMMENDED: 800MHz CPU; 256MB RAM; GeForce2 card.

DEVELOPER: BioWare www.bioware.com

PUBLISHER: Atari www.atari.com.au

DISTRIBUTOR: Atari www.atari.com.au

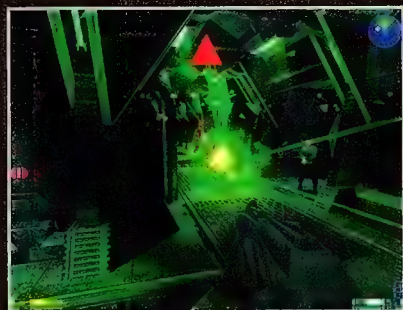
PHONE: Atari (02) 8303 6800

Great variety of new spells and feats; prestige class; new and engaging story; great sound and music.

New abilities should have been in the original; not a continuation (no old characters); max level cap remains. On the whole unsatisfying.

Star Trek Elite Force 2

Logan Booker may have prematurely blown an EPS conduit in excitement.



Ah, vaporised Romulans. Shame this is the only level you get to use the Disruptor.



Using the Tricorder, you'll need to solve puzzles to open doors and access consoles.



'Great job, Cadet. You've blown the Turbo Shaft and the fluid back-up is cleared.'

Star Trek fun for Star Trek fans. It's the easiest way to describe Star Trek Elite Force 2, the sequel to Raven's Star Trek Voyager Elite Force. With the names of both titles being considerable mouthfuls, you'd expect them to be chockers with cheesy show tie-ins and one-liners. And they are. While it might be Trekker-overload for the cliché-squeamish, it'll generate a warm flow of energetic plasma in the rest.

Ritual, the company working on Counter-Strike: Condition Zero, is behind this outing. Raven did some amazing stuff with the Quake 3 engine with the original EF, and Ritual has topped its effort with the sequel. Along with sharper, detailed textures and higher poly counts, Ritual has done significant work with the animation and polygon detail of the character models. Equipped with rudimentary deformable mouths, eyebrows and eyes, bendable fingers and more flexible limbs, characters can now convey a range of emotions via their faces and body language. It doesn't add much to the action, but it goes some way to breathing life into Picard, Munro and his cohorts during the in-game cinematics.

You heard right – EF2 puts you at the helm as Lt. Alex Munro, the grizzled protagonist from the first game. Rather than continue where EF left off, EF2 opens with the player reliving the last episode of the *Voyager* series – with the ship and crew 'trapped' inside a Borg Sphere. Admittedly, it's funky to play out, but it also acts as the plot anchor to secure the player into their role – leader of the elite Hazard Team. So elite in fact,

it's disbanded once the squad returns to Starfleet.

From here, it's a mixed bag of tribbles. There's no argument, EF2 is a run-of-the-mill first person shooter, with the standard selection of weapons replaced with futuristic counterparts. The environments are bright, shiny and colourful compared to the urban plainness of recent titles, but anyone after a revolution in gameplay, weaponry and multiplayer will be disappointed. It's not surprising, and it's definitely not a requirement – the *Star Trek* universe is just a theme applied to the standard FPS format, just like Raven Shield or IGI 2 are applications of the covert ops theme. To criticise the game for this isn't fair – unless it does a poor job. Thankfully it doesn't, and players will be comfortable with the Starfleet Assault Rifle (shotgun) and the Enhanced Compression Rifle (M16 with grenade launcher), along with the other weapons.


As far as gameplay and storyline go, EF2 is a hybrid of Quake, Pipe Dreams and The Dating Game. Between missions you'll be allowed to venture around the Enterprise-E and 'chat-up' crewmembers. Ultimately, you'll have to choose between Telsia, a member of Hazard Team, and Kleeya, an attractive alien who joins the crew. You can't skip these 'information gathering' sections, which is a negative if all you're after is carnage. The Tricorder puzzle sections, which 'play' much like Pipe Dreams, also detract from the action.

The only *Next Generation* character you'll meet is Jean-Luc 'Xavier' Picard. Patrick Stewart's

vocal presence, along with the other excellent voiceovers, movie-quality sound effects and music, adds some authenticity to the plot. Shame none of this could keep EF2's story in high orbit.

Sci-fi demands the suspension of disbelief. EF2 demands the complete and voluntary shutdown of your cerebrum. The plot holes are unforgivable, and some of the in-game cinematics will have you reaching for the cyanide. While you can live with the animation (it is Quake 3), the story is nothing short of blinding. On one mission, Munro stands in open view for a good minute – right after his companion is shot by a Romulan sniper; while on another, stealth is 'required' to sneak into a Romulan base, but neither the guards nor Picard care if you just shoot everyone instead.

A side objective throughout the game is the discovery of 'gold enterprises', which when enough are collected, open secret levels. Trust me, they're not worth the effort to find – the extra levels are nifty, but hardly a just reward for the time you'll spend earning them.

Ultimately, EF2 plays like a game where plenty of effort has been poured in, but the polish and final touches haven't. If you like *Star Trek*, it's a great play, you'll appreciate the story. But For FPS gamers, it's just another shooter. 

SCORE

7/10



GAME DETAILS

REQUIREMENTS: 600MHz Pentium or Athlon-class CPU; 128MB RAM; DirectX 9.0; 32MB DirectX video card.


RECOMMENDED: 1.4GHz CPU; 256MB RAM; 64MB video card.


DEVELOPER: Ritualistic www.ritualistic.com

PUBLISHER: Activision www.activision.com

DISTRIBUTOR: Activision www.activision.com

PHONE: Activision (02) 9869 0955

 Nice graphics on low-end systems; solid *Star Trek* feel; decent FPS action; plenty of intergalactic babes.

 Glaring plot holes; dodgy cinematics; nothing new for the genre; may need a patch for minor stability problems. No Seven.





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Tomb Raider: Angel of Darkness

John Gillooly watches darkness descend on the Tomb Raider franchise.



Lara squats, gripping the weapon as tightly as she can, preparing for the exquisite pain.



The only bloke in the world who can't hear Lara coming.



Lara's rain-soaked shirt clings tightly to her athletic chest, while she pouts into the distance.

Despite the tendency for average gamers to dismiss Tomb Raider because of its mass market breakthrough, it still stands as a milestone series. The first Tomb Raider introduced a whole generation to the world of 3D and provided a tricky yet satisfying experience.

With this in mind, the concept of Tomb Raider: Angel of Darkness sounded like it could work; drop Lara into an adventure game, trying to solve some mysterious murders for which she is the main suspect. Rather than pure push-block, back-flip-over-there type puzzles, Lara begins the game in Paris, where she soon has to roam the streets finding and conversing with people, doing quests and occasionally flip-flopping her way out of trouble.

Angel of Darkness brings a few other things to the series, namely another playable character called Kurtis Trent. This is a refreshing change to the previous fixation solely on Lara's perfectly formed buttocks. The save, inventory and control systems have also been changed significantly and the graphics engine has been given a major spit and polish.

It's nice to see Core Design still remembers that it is considered one of the 3D graphics pioneers. The PC version of this game has the most comprehensive configuration menu we have ever seen and the PS2 version is one of those games that remind you just how powerful Sony's console is. Paris and Prague look alive, with amazing lighting effects and some slick texturing work. It is just unfortunate that Lara herself seems

blessed with a face resulting from some bizarre cel-shading experiment.

But it is the revamped control system that makes this game; makes this game a frustrating simulation of being on mildly hallucinogenic sedatives, that is. Frankly, this is one of the worst control systems seen in a big name game. By her very nature, Lara is a lithe, agile, buxom... oops, got sidetracked. Lara's very gymnastic ability demands a control system that gives instant response, which is fast yet precise. The new control system is nothing like that. Trying to manipulate Lara is an exercise in Zen-like patience as the analog-only control has her swimming backwards, forwards, left and right as you try and position Lara for some feat of aerobatics. There is a walk function which makes things slightly less painful as you cannot fall off something when it is on, but positioning is even more of a bitch when walking.

Reasoning for the change is understandable but indicative of what plagues the whole game. There are just too many good ideas implemented in a half-arsed way. Core has added stealth elements as another way of deepening the Tomb Raider experience. This consists of a sneak button and a Solid Snake-style wall sneak. Unfortunately these are rarely needed, and the wall sneak in particular is frustrating and clumsy.

Other examples of half-arsed implementation are the simplistic hand-to-hand combat system and the highly linear conversation system. In one of the first conversations in the game with Madam

Margot Carvier, Lara can screw up so badly that Madam Carvier is convinced that Lara is the killer but in a strange cutscene jumpcut moment still gives her the notebook belonging to Lara's last alleged victim. It just doesn't make sense.

It is not hard to see the game Core Design was trying to make. As long as it didn't end up with a control system useful only to the precogniscent it could have been amazing; a new generation of adventure platformer; non-linear storyline; the ability to choose stealth or pursuit; combat not involving the brutal slaying of endangered felines. In the end it looks like a game that despite constant delays was still rushed out the door. In fact EIDOS is so unhappy with the game it has since handed over control of the franchise to US development team Crystal Dynamics. Even producers of the second Tomb Raider movie are blaming Angel of Darkness for poor box office performance.

Tomb Raider fans will either love or hate this game, but what enjoyment to be had is marred by the control system. It's nice to see Lara back again in a more badarse role than before. How we wish the original vision for the game could have been seen through to the end rather than rushed and left partially completed.

SCORE

3/10



GAME DETAILS

DEVELOPER: Core Design www.core-design.com

PUBLISHER: EIDOS www.eidos.com

DISTRIBUTOR: Gamenation www.gamenation.com.au

PHONE: Gamenation (02) 8303 6800

Fresh approach to the franchise, gorgeous graphics. **D**: Dire control system, general feeling of it being unfinished.



YOUR VOTE COUNTS!

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HALL OF FAME

1 new member to be
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Indications obvious

Look out! Simulated explosion effect! Lucky for you, it was only your computer that got toasted – that'll teach you to eat cornflakes and milk out of your PSU. Tisk, tisk, says Daniel Rutter, who's on the scene with tweezers and an MX700 cordless mouse for IOTM. Electrifying!



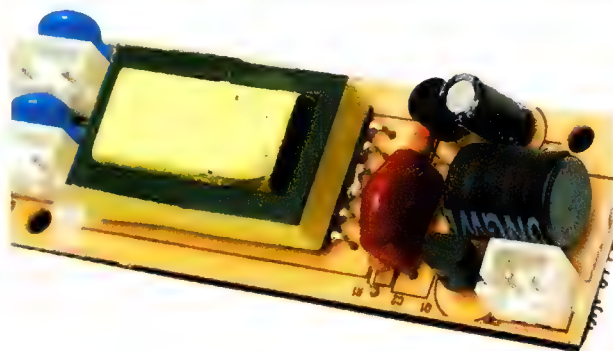
IOTM:

I Inverter emanations

I was once told fluorescent lighting should be avoided for network cable pathways, because of the interference that it generates. This made me curious about the interference created by fluorescent case lights, especially with the close proximity of IDE cables and motherboard buses.

I know that normal fluorescent lights are much larger than CCFLs, but case lighting is in a smaller space with metal walls designed to keep interference out (in this case, keeping it in). Is data corruption a consideration when lighting a case?

Phil Choo



↑ ABOVE: High voltage, high frequency, low cost; CCFL inverters really ought to cause more problems than they do.

O Indeed network cables should be kept away from fluoro light batten and electrical cables, and certainly not run parallel to them. If a network cable in the ceiling has to cross a batten or cable, it should do so at right angles, to minimise interference. Network cables should also be strung as far above interference sources as is possible.

You'll generally, actually, get away with draping network cables over a batten or three, any way you like. But it's best to assume that the batten pump out a lot of noise and that the nodes at either end of the cable are particularly intolerant of it, and do what you can to minimise interference, simply because it's likely to be such a pain to re-pull the cable if this does in fact turn out to be the case.

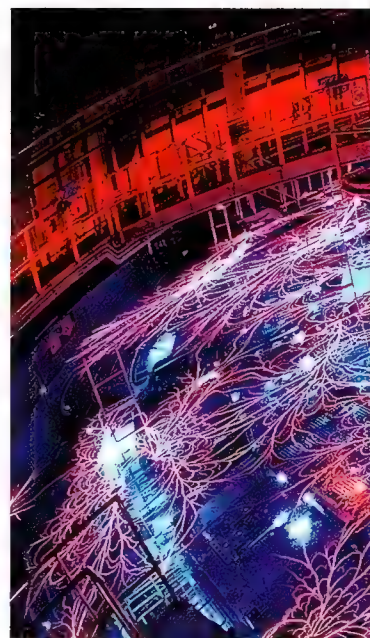
PC cases are earthed, and sink radio frequency interference (RFI) to ground, so RFI sources inside don't just bounce their energy around within the box. If the earth is lousy then this won't happen, and it won't happen at all if you've got a stylin' modded case made of wood or plastic or something, but generally speaking, the metalwork inside a PC soaks up the RFI that hits it.

Despite this, you'd think that sticking CCFL gear next to data leads would cause problems, but in practice, it doesn't.

Cold cathode fluoros, their supply wires and their inverters are a significant RFI source, but it turns out that all the measures modern PCs have to protect them from their own interference also quite effectively protect them from interference from other sources.

Up to, but not including, the geek next door and his converted-microwave-oven HERF gun.

↓ BELOW: Just the same, though, you shouldn't let too many people with CCFL-lit computers come to your LAN party.



SAMSONITE COMPUTING

I My mate is putting a PC in a suitcase, but his video card is too tall. Is it possible to make a right-angled adaptor for an NVIDIA Ti4400 video card that will work?

Russell Farley

O Make? Well, in theory, yes, but you'd do better to buy one.

Right-angle AGP (and PCI) adaptors exist, and aren't very expensive, though your local computer store probably doesn't have them. They're used in one and two unit rack cases (which aren't tall enough to accommodate normal cards vertically), and may even support AGP 8x.

Not that that matters a lot; if you end up having to use a slower AGP mode (assuming the card and mobo your friend is using both support 8x in the first place), you won't sacrifice

any noticeable performance.

Finding such an adaptor without ordering it in from overseas is the tricky part. AGP riser cards aren't in a whole lot of demand among server builders, so they're thin on the ground. Server boards these days often have integrated video, and the ones that don't have it often still don't have an AGP slot.

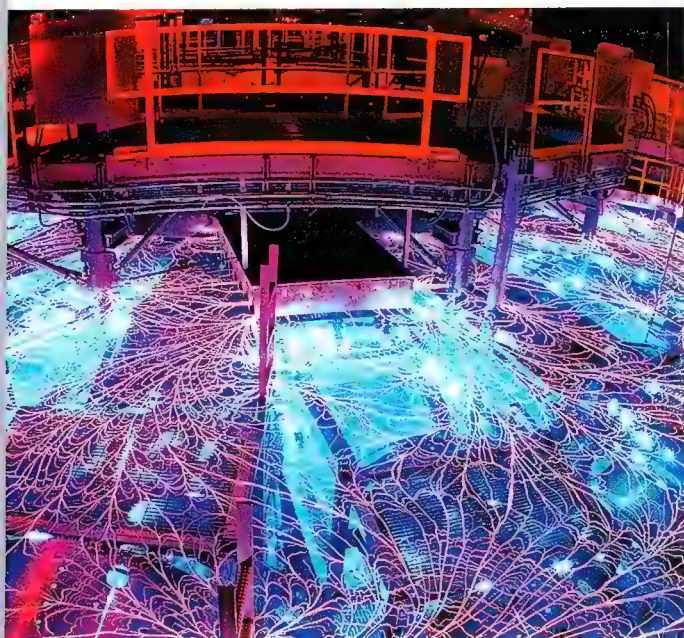
IMAGINARY OVERCLOCKING

I I have an ASUS A7N266-VM motherboard and a XP2200+, which is achieving the AMD specified speed of 1,795MHz.

The ASUS board comes with a 'PC Probe' utility that says the CPU is running at the minimum speed of 1,800MHz, but can achieve a maximum of around 2,000MHz.

What can I do to get this speed? Is this utility just yanking my chain?

Stuart Coulson



O What you can do, is change your motherboard. The non-VM, full-ATX version of the A7N266 allows basic frontside bus (FSB) overclocking via the usual software configuration in the BIOS setup, but I don't think any BIOS version for the micro-ATX A7N266-VM allows FSB tweaking. You're stuck with either 100 or 133MHz, pre-doubling, set with jumpers on the board.

The ASUS utility is basically just guessing about the overclock that's possible (on a board that allows overclocking at all. . .), and its guess is a conservative one.

Winding up an 1800MHz-ish CPU to 2GHz is only an 11% overclock, which many CPUs can manage without even increasing the core voltage. Practically any CPU can be overclocked by about 10%, except for some special, select cases that simply won't budge.

But who cares about those?

On the minus side, an 11% CPU overclock is unlikely to give you a noticeable performance improvement for any real world task.

It's nice to have if it doesn't hurt system stability, but it really doesn't matter much.

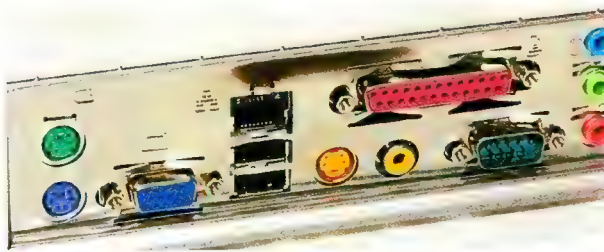
THE NEW HOTNESS

I Why do motherboards contain so much legacy stuff? I mean, look at how big motherboards are, they are huge! I want smaller, fully-featured and non-integrated motherboards. Look at those huge 64-bit PCI slots. (What people do for backwards compatibility. . .) Can I have my mouse now?

Michael

O And now, on with the answer.

What 'legacy' means depends on who you ask. ISA slots, yes, but serial and parallel ports generally count as 'legacy' as well; 'legacy free' motherboards have extra USB,



↑ ABOVE: Modern motherboards can have very peculiar collections of back panel connectors.

FireWire and digital audio ports in their back panel connector block in place of the old nine and 25-pin D- sockets.

A full list of legacy interfaces also includes PS/2 mouse and keyboard connectors and the floppy disk controller, though, plus less important stuff like the gameport and Infrared Data Association (IrDA) interface. PS/2 ports are proving hard to kill, and so are good old 36-wire ribbon-cabled floppies.

There are a few reasons why the old interfaces keep popping up. One reason is that people *want* them; they want to be able to plug in their old parallel printer or serial modem or PS/2 keyboard without buying a USB-to-whatever adaptor.

Another reason is that half of the interface to connect these things is still built into modern chipsets. Modern motherboards don't have an ISA bus any more, but their peripheral bus controller ('Southbridge') chips still have a Low

NOTE: Asking for the IO Of The Month prize in your letter is considered impertinent, unless negotiable securities and/or premium beverages are also provided for the judges' final consideration.



Pin Count (LPC) interface built in. LPC is what replaced ISA for connections to the Super I/O chips that are used for all of the legacy stuff – and which may do fan and temperature monitoring, too. The incremental cost to the motherboard manufacturers for including the legacy interfaces isn't large.

If you ask for a 'fully-featured' motherboard, you're asking for a board that has all of those old legacy interfaces. They *are* features, after all.

There are plenty of micro-ATX and smaller boards around these days, though, which may suit you. There are tiny 'Small Form Factor' boards that fit in toaster-sized cases but can accept high-end CPUs and an AGP graphics card, and there are cheaper boards, just as small, that use low-power VIA CPUs and are still adequate for less demanding tasks.

Yes, all of these boards still have a floppy drive connector on them, and probably PS/2 and serial and parallel ports, too. But you don't have to use them.

■ DOUBLE-ADAPTED AUDIO

I After seeing *Atomic's* review of the Logitech Z-680 speakers, I bought the Z-640 (because I only had \$200). The speaker package includes a console video game adaptor, so I decided to connect both my DVD player and PC to it.

I then bought myself two 3.5mm stereo socket-to-3.5mm stereo plug adaptors and two 3.5mm stereo plug-to-3.5mm stereo plug extension cords to split the green and black plugs on the speakers.

After plugging everything together, problems appeared. The volume decreases by half when I play music from the PC. It gets even more bizarre when I turn my DVD player off instead of standby; volume goes back to normal.

Also, when I play music from the DVD player, the sound quality is not as clear as it could be compared to the sound from the DVD player connected alone to the speaker.

Is there anyway I can connect both DVD and PC to these speakers without losing any quality?

Ping Nam Hui

O The volume oddities are happening because of impedance mismatches – the output impedance of your two devices changes depending on whether they're turned on or not. When the aggregate impedance is different from the input impedance of the speaker system's pre-amplifier, stuff goes weird.

Impedance mismatches can cause things to sound louder or softer than they should, and they can also cause frequency response problems. That's probably what explains the lousy sound quality from the DVD player.

The solution is to switch the two inputs so the speakers can only see one of them at a time. Simple passive 'input selector' switchboxes with two or more sets of RCA-plug inputs and one RCA output are available, quite cheaply. To use one of those, though, you'll probably need to get 1/8-inch-to-RCA adaptor cables as well, as not many selector boxes have 1/8-inch connectors.

■ TRANSFER POWER TO WEAPONS!

I Can I transfer power from one power rail (e.g. 12V) to another (e.g. 5V)? I noticed your guide (somewhere!) on supplying 7V to case fans by reversing the wire on 5V. Does this give extra power to the 5V rail?

Your recent water-cooling/Peltier guide was great. I'm wondering whether it is possible to replace water with some other liquid, since the only thing that holds me back from water cooling is the fact that a small leak will kill everything in the box. And if so, what is a good alternative?

Robin Cao

O Connecting loads between one PSU rail and another to get the difference of their values across the load is a simple hack, but not a very elegant one.

Most PSUs don't mind you doing it, but it's a better idea to use a proper fan controller, if only because of the havoc that'll occur if your fan manages to short circuit, connecting the rails and nuking half of your PC.

? DVD and CD glass masters are made using a technique called 'electro-forming'. It involves using very pure metal to make duplicates of intricate surfaces.

In any case, there's no way to use one rail to boost another unless you make a regulator circuit that throws away a lot of power as heat.

Some motherboards do tricks like this to get a reliable 3.3V supply from lousy PSUs; they don't use the 3.3V rail, and just regulate down the 5V one.

There's no cheap liquid ('cheap', here, means 'under \$150 a litre') that's anything like as good as water at moving heat. Many alternative candidates have other serious drawbacks, too; an alcohol-filled cooling system can do much more exciting things than a water-filled one, if it leaks. And just try getting mineral oil out of the carpet.

Water with a shot of automotive radiator additive in it – the usual PC coolant – won't necessarily be as bad for your computer as you might think if it spills. If the whole contents of your reservoir gets pumped through the little vent hole in your hard drive then yes, that'll pretty much thork it, but PCs have survived spills of nastier stuff than automotive coolant.

Yank the power cord, disassemble, clean everything with tap water and/or alcohol, dry thoroughly and reassemble, and you're surprisingly likely to be back in business.

Of course, the idea is not to have leaks in the first place. Choose quality tubing that fits your hose barbs, use hose clamps on everything, and take care when working on the system, and your mobo ought never to feel a drop of rain.

■ HEAR YOUR PC THINKING

I If my computer and speakers are turned on, and I am not playing any sound through the speakers, whenever I load a program and the hard drive spins, I move the mouse, I type on the keyboard etc, I get slow buzzy/farty sounds coming out of my Cambridge Soundworks 2.1 channel speakers. Even a flashing cursor makes a noise. This happens both when I am using my onboard sound or my PCI sound card.

Apart from this, everything seems to work OK – no crashes or BSOD, music or game sound is OK (although a little hissy). What the?

Surely this can't be normal. I've removed all PCI cards to the absolute minimum, changed drivers, checked connections, virtually stripped down the computer and rebuilt it from scratch to no avail.

Grant Matters

O This is actually quite a common phenomenon. It's radio frequency interference from your PC, which is being picked up and amplified by the speaker electronics, along with the signal you actually want.

Practically all PCs emit enough RF to cause this problem; many cheap computer speakers will produce a noticeable buzzing when the volume's at a normal setting.

If you don't hear the noises through headphones (there'll probably be a bit of hiss through headphones with the volume turned right up, and it may vary with what you're doing, but shouldn't be nearly as noticeable as the speaker noise), then it's definitely the speakers at fault.

Higher quality speakers *might* help; so might a better quality signal lead from the computer to the speakers. First, though, I'd try rearranging the computer and speakers. You want to move the speaker amplifier module (presumably in the subwoofer, for your 2.1-speaker set) further away from the PC.

Move it as far as the standard lead will let you, and see if the problem is reduced. If it is, but you'd like more, buy a longer lead.



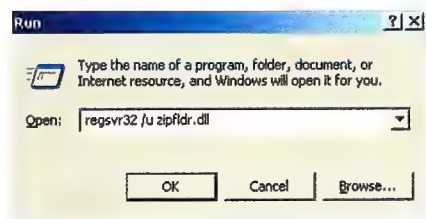
'Give us a tweak, you're the tweakin' man, give us a tweak tonight. Cause we're all in the mood for a tweak0ring, and you have us tweakin' alright.' (Apologies to B. Joel.)

SERVE IT UP, SERVE IT UP, BUDDY GONNA SHUT YOU DOWN

Our first tip is for Windows 2003 Server! One of the 'features' of the new OS from Microsoft is tracking of shut-downs. Each time you shut down the system, Windows wants to know why, with your reasons appearing in the event logs. This is bloody annoying, so let's turn this feature off.

You need to edit the local computer policy via a management console, so from the command line, run 'mmc', which will open a blank console. Then press Ctrl+M to add a new snap-in. Click the 'Add' button and select 'Group Policy Object Editor'. Make sure 'Local Computer' is entered in the 'Group Policy Object' dialog box, then hit 'Finish'. Click 'Close' on the 'Add Standalone Snap-in' page, and 'OK' in the 'Add/Remove Snap-in' page.

Next, drill through to Local Computer Policy -> Computer Configuration -> Administrative Templates, and with the System folder highlighted, double click 'Display Shutdown Event Tracker', in the right-pane. Select 'Enabled' and in the drop-down box,



LEFT: After some more memory? All you need to do is unregister the zipfldr.dll file. That's it.

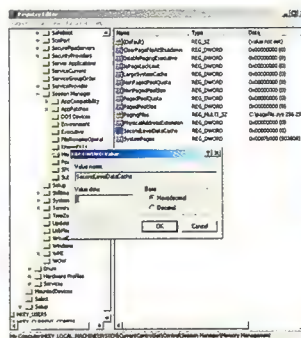
choose 'Never'. Click OK, close and save. If you are running Windows 2003 Server - Enterprise Edition, simply select the 'Disabled' option.

PLACE IT IN YOUR MEMORY, DON'T LEAVE IT UP TO HAL

Windows can be a bit of a 'tard sometimes, and either forgets or plain ignores the fact your CPU may be fitted out with a full 512KB L2, or second level cache. If, for example, you have a new Athlon CPU with the fancy schmancy Barton core, then give Windows 2K/XP a poke in the ribs and tell it how much cache you have.

In regedit browse to [HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Session Manager\Memory Management\] and set the value for 'SecondLevelDataCache' to the value, in kilobytes, of your actual L2 cache size. A value of '0' tells Windows to try and autodetect the value from the Hardware Abstraction Layer (HAL).

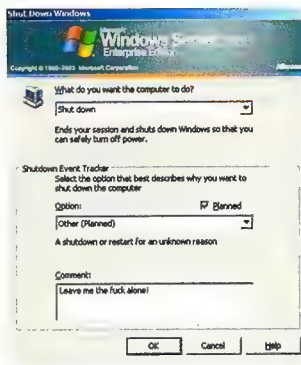
Don't be clever and tell Windows you have four terabytes of cache. We all know you don't, and it won't take long for it to figure out either. If you do, however (and I seriously recommend that you don't), let me know the results.



WHEN A FOLDER COMES ALONG, YOU MUST ZIP IT

Windows XP has the capacity to deal with a ZIP file as a regular folder, without needing third-party compression tools such as WinZip. As handy as this is, it chews up a fair chunk of resources. You can disable the feature by un-registering the appropriate DLL.

Go to Start -> Run and type 'regsvr32 /u zipfldr.dll', then click OK. Don't forget to grab a copy of WinZip or WinRAR, though, or all those ZIP files will do is just wink at you teasingly.



ABOVE: Chat about your L2 cache, and not why you're shutting down.

THE MEMORY REMAINS

A pain in the butt for most Windows users is that Windows likes to presume too much. It think that just because you've closed an application, you'll want to reopen it again real soon, so it stores a bunch of DLLs in memory until it gets bored waiting for you. You can force Windows to unload DLLs from memory as soon as you have finished with them with a trip to the registry:

Navigate to [HKEY-LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Explorer\], create an entry called 'AlwaysUnloadDLL' and give it a value of '1'.

Don't make Phr33x do all the work! Achieve fame and glory and send us your tweaks! Email them to phr33xtw33x@atomicmpc.com.au. Do it. Do it now.

SP



Grinding the midnight oil

Don't be a tool – get the right gear to work your case over. The last thing you want to do is retrieve lost fingers from your makeshift saw, or redo some sanding because your sister's nail files are too fine. Have a read of Ron Prouse's kit guide and grab the right stuff for the job.

As case-modding has become a mainstream marketing phenomenon, 'after-market' companies have been quick to release products that cater to the growing group of people who want the 'modded look' straight off of the shelf.

You can now buy a 'standard' PC case that, only two short years ago, would have won you an award at an international modding competition!

So where does this leave the hard-core enthusiast – the people who gave birth to this popular trend? Should we just give up on the DIY enjoyment factor and buy pre-made? After all, there is little satisfaction in completing a mod that looks second-rate compared to one you could have bought over the counter!

The only answer there could be is, 'Hell no! I want to add my own touches!' To some of us, all this means is that the challenge has been made, and the 'quality' bar has been raised a notch. Although glamorised by housing some of the highest tech components known to man, the hobby of modding the humble PC case is simply a process of cutting, grinding, polishing and painting.

These are the critical skills – the challenge is now to produce a professional looking result that also reflects the individuality of the owner.

The theme of this Modjitsu is to explore some of the tools that can be used to achieve that final, mind-blowing result – tools that will simplify the process, and the attributes that make them a good choice.

To keep costs to a minimum, none of the tools in this article are excessively expensive. Also, keep in mind they will last you for many years to come, and for countless other projects and cases.

By having the right tools for the job, and with some practise and experimentation, you will find you can quickly gain the sheet-metalworking skills you need.

Remember, there is always something unique that can be done to any PC box. As long as the modder has the tools and the skills to turn the initial concept into a reality, imagination is your only limit.

SAFETY COMES FIRST

There is one really important genre of modding tools I'd like to mention first up – safety equipment. Sheet metalwork is fun, but go to any metal-fabrication workshop and have a look at the OH&S measures taken, which are required by law. Wearing safety goggles, ear muffs and leather gloves might feel stupid at first, but protecting your sight, aural capability and body extremities when cutting, grinding and polishing metal is just simple common sense.

Have you ever been fragged by a one-eyed, deaf gamer with three fingers?

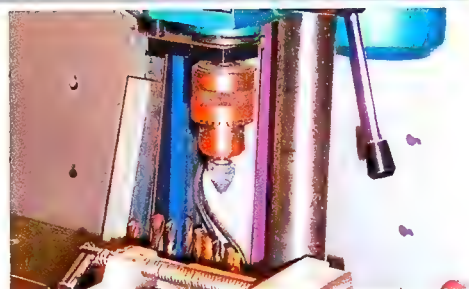
I rest my case!



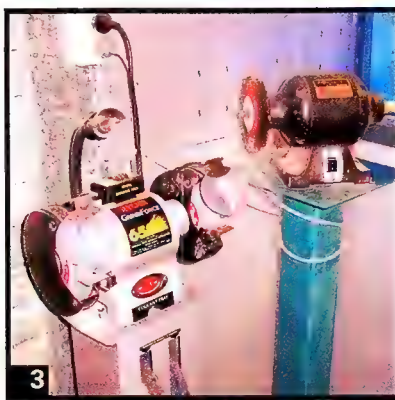
POLISHING, DRILLING, TAPPING AND SOLDERING



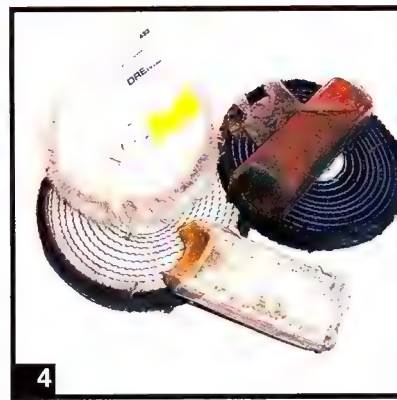
1 If I was buying tools 'from scratch', a drill-press is the first thing I would spend money on. It's *the* best friend you can have when it comes to drilling holes with precision, especially when you combine it with a good 'engineer's vice' and a range of high quality drill-bits. Look for a press that has five or more speeds, a 13mm chuck, and accurate micrometer depth-adjustment. As an example, the LCD display tutorial in *issue 26* required 4mm deep holes to be drilled in a bezel 5mm thick – leaving no room for error! Once you have your drill-press, make sure it's mounted securely, with the base at roughly chest height and plenty of light on the table area. Enjoy it for years.



2 Wherever possible, I use standard 'PC' screws to assemble mods. This means drilling and tapping holes to fit 3mm x 0.5-pitch screws. The best option is to purchase the taps you need individually. The most suitable wrench is a 'T-bar' drill-chuck, as it's easier to control in thin-gauge metal than a tap wrench, and less likely to end up cutting on an incorrect angle. When tapping into plastic, always back right out of the hole every two full turns inward.



3 Bench grinders are another 'must-have' item, and with some additional attachments can be really versatile. I have mine set up with both coarse and fine grinding wheels, a wire brush as well as a polishing bezel. Like a drill-press, grinders should be mounted very securely, and it is a good idea to have as much clear space around them as possible. This will allow for easy manoeuvring of the part being worked on.



4 Using a buffing wheel on a bench grinder is the quickest way to polish metal and plastic components. There are three main types of buff pads – 'sisal composite' for heavy duty work, 'stitched rag' as an intermediate step, and 'floppy' or 'linen pad' for final polishing. The 'ingots' are polishing compounds, and they also come in varying types and degrees of abrasiveness specific to the material being polished. Buffing plastic is easy, but be careful not to get it too hot or it will burn.



5 Soldering is an integral part of modding, and it's important to have irons that suit the type of work you're doing. A large-tip, high-wattage iron is good for tinning and joining wires, but for PCB or component work a needle-tip is a must. Magnified 'extra hands' are useful for intricate work, and heatsinks (the red thing) will protect sensitive IC components. A multimeter is an absolute given, but that's a whole chapter on its own.



6 Keeping errant wiring looms under control and out of sight is never an easy job, but something I have just started to use for that task is a glue gun. Rather than using a heap of wire ties, it's easier to strategically place dabs of glue wherever they are needed – and it's an even simpler task to peel them off later should the need arise. This is an excellent way to mount cathode tubes, too, and the elasticity of the glue helps to protect them against shocks.



Conclusion

If this list (and its associated cost) horrifies you, look at it from a long-term perspective. Acquisition over a period of years, getting the things you need as you can afford them, and keeping an eye out for bargains is the way to do it. If you aren't sure if a tool will perform the right task, see if you can borrow or hire one to try it out, or at least get the retailer to give a demonstration. Second-hand from garage sales, auctions or newspapers are other good sources for cheaper options.

1 The name most synonymous with case-modding would have to be 'Dremel'. In fact, if you're serious about modding it would be the first tool you would buy, correct? Well, I have to disagree. My Dremel is the least-used tool I own, and I've even made the mistake of buying additional attachments to try and find a worthwhile use for it!

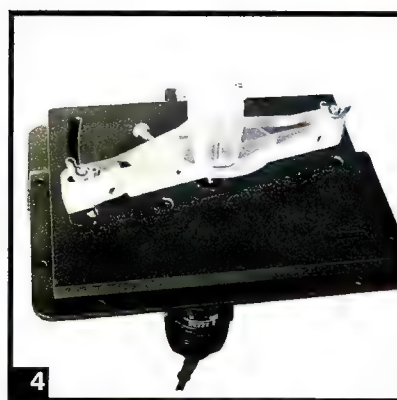
The truth is it's 'dinky' – it's simply too slow when it comes to cutting metal, relatively expensive to use as a grinder, and underpowered when polishing surfaces. The forte of the Dremel is performing 'detail' work, fiddly jobs that require maximum precision, yet I find that in this area hand tools offer more control. But if you already own one, or feel the need to spend \$300+, I've found the best results can be gained with the following:



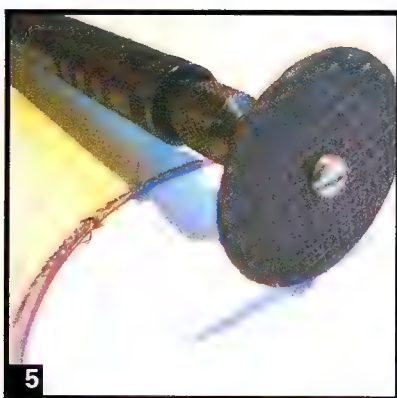
Until I invested in the Dremel flexible-drive attachment I never used mine at all – the bulky tool 'body' always seemed to get in the way and control seemed rather limited. The flex-drive 'pencil' gives better control over the work-tip, and allows you to get into tighter areas. The adjustable arm used to support the drive unit in this picture is a discarded heavy-duty document holder – but any handy sky-hook will do the job.



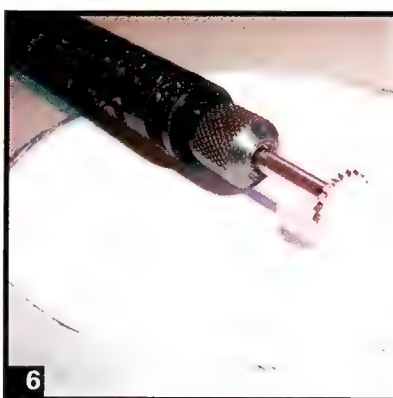
If you are drilling holes or grinding with limited access, then the right-angle attachment is perfect. The only downfall is that it doesn't work with the flex-drive – as it has to be attached directly to the drive unit – so supporting and controlling it becomes a two-handed task. A great tool to have for those *three* times you'll need it . . . over the next decade. A great present for the modder who has everything.



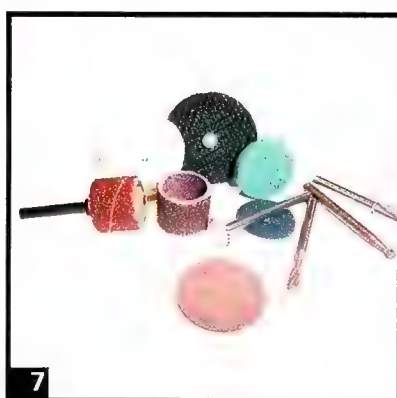
The Dremel router table is great for detailed rebating on acrylic sheet, or using it for intricate shaping on aluminium components. The micrometer depth adjustment is really handy for precision work – I used it to fabricate the windows for the PSU mod in *issue 26* and the Macase panel in *issue 27*. The main downsides are that the router bits are expensive, and only suited for timber or plastic, not metal.



The standard cutting discs are fragile and wear away easily, so even cutting out an 80mm fan-hole becomes an arduous task. The answer is to use the fibre-reinforced cutting discs. They are ridiculously expensive at first glance, but a pack of five will outlast up to 100 of the standard items, and saving you from having to constantly replace worn cutting tips. They are shatter-resistant, too, making them much safer to use.



Finally, the best Dremel tool available! It's perfect for detail-cutting for acrylic and Aluminium, and very controllable with the flex-drive. The blade is 1mm thick, and it's 9.2mm diameter has 20 teeth, which equates to 19 teeth per inch. Blade life is exceptional in the above materials, and cuts in plastic are smooth and 'burr-free'. The only limiting factor is when the blade depth of 3mm is reached. If you own a Dremel, you need one!



I have a love/hate relationship with the Dremel. The large selection of attachments would seem to offer great all-round versatility, but in reality it only performs a few functions (I want it to) well. My main complaint is the direction of rotation – for a right-hander it seems to rotate so that it's 'exit' tangent is always directly into my eyes. And at 37,000rpm it's dangerous and annoying! The question is, can you be a 'real' modder if you don't own one?



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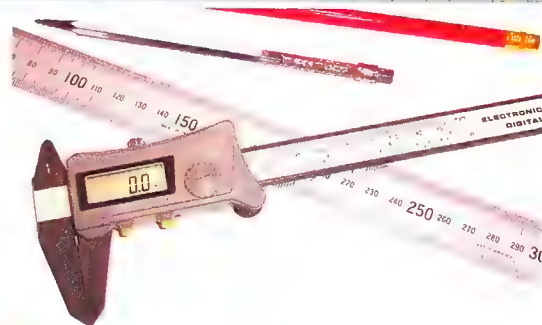
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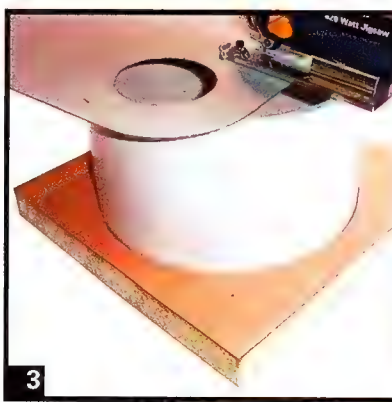
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1 It's safe to say that most case-mods will eventually require you to cut a hole into metal or plastic. The most common holes are for fans and windows, and therefore require a tool that can cut through the case body panels with precision and a minimum amount of distortion – so an axe is usually out of the question.

The first step is the most boring one – marking out where the cuts need to be made. The more precise your measurements the better the outcome, so using an accurate ruler or square, vernier callipers and scriber/pencil will provide you with an accurate set of lines to cut to. Remember, 'measure twice, cut once'.



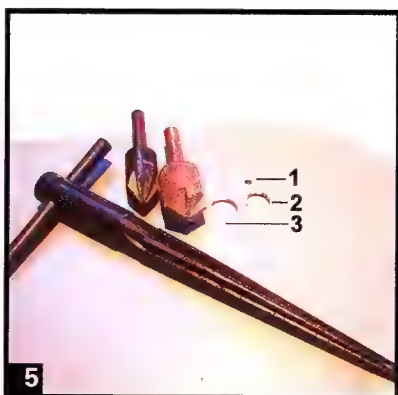
2 My favourite weapon for long cuts – like windows – is the jigsaw. With the right pitch blade (red = 25 teeth/inch), a jigsaw will give smooth, clean cuts and cause very little trauma to the remaining metal – meaning no 'waves' or dents, even with thin-gauge Aluminium. Always cut to leave 1mm or so for final filing and sanding. The important point is to keep the panel well supported right around the work area. To achieve this, I fabricated the 'Dunny Seat'.



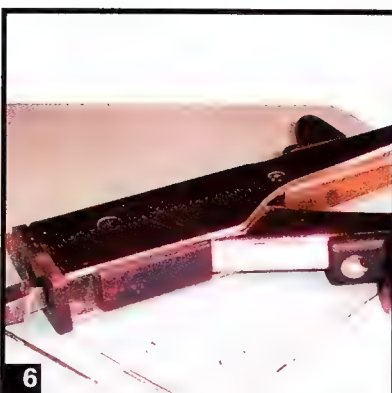
3 About two years ago, I made my first 'Dunny Seat' from scrap 35mm thick timber and 300mm diameter PVC water-pipe, and now I can't mod without it! It supports the panel that you're working on evenly while cutting in the centre section, and allows you to turn the panel as the cut progresses. It is also a great 'jig' for using when grinding and sanding. If Lian Li ever releases this as a product, please remember where you saw it first.



4 Good quality hole saws are justified if you are cutting in large volumes. Always go for the size slightly smaller than the desired diameter to allow for finishing off the edges. The best method I've found is to drill the four fan mounting holes first. Then screw the panel to a block of wood, and then use the hole saw. This keeps the panel supported, reduces vibration and keeps the pilot drill centred, so the hole will be perfectly round.



5 Ever been threatened with a reaming? That's a reamer at the bottom of the picture – and yes, it would really hurt! Drilling perfect holes larger than 10mm in sheet metal is nearly impossible with an ordinary drill bit, whereas reamers are designed to cut holes without twisting or distorting the sheet. The small hole #1 is the 'pilot hole', #2 is the hole reamed out to 12mm, and #3 is after the finished hole has been countersunk to remove the ridge.



6 The famous nibbler. As used for the Lian Li faceplate mods on the Heavy Water Project, the nibbler is a small guillotine that neatly removes 5.5 x 2.1mm 'rectangles' from flat sheet metal, and it works brilliantly on Aluminium as well. One of the areas that the nibbler excels at is cutting square corners with precision, and if used properly there is very little finishing required for the cut edges. Although time consuming, the nibbler can even be used for large projects like windows.



7 Filing is not an *extreme* past-time. In fact, it's dead boring, but it's the process that will make or break the final look of any mod. You can never have enough files, and you should get your hands on as many different sizes and shapes as possible. Large, coarse files are used to remove the majority of unwanted material, and then the less abrasive 'jeweller's files', in the centre, are used to shape and smooth the surface ready for sanding. Keep files clean by using a wire brush to remove clogged filings.



1 Bending sheet metal to shape is a simple process as long as you use a strong vice, a solid steel bar and a hammer with a nylon head. For accuracy, measure the required length to the centre of the inner-side of the proposed bend, and mark lines with a scribe. Clamp the entire length being bent between two pieces of solid steel, and then use the hammer to slowly 'chase' the sheet metal over, working the whole length a few degrees at a time. Nylon hammers help cushion the blow and spread the impact area, which stops the metal 'stretching'. All folds should be bent a little further than the desired angle, and then gently straightened – this helps to get a defined crease on the bend.



2 Acrylic sheet can be bent using the same basic method as for steel, but using a heat-gun instead of a hammer. Measurements should be made as above, and then once the acrylic is clamped the heat-gun is used to soften the plastic right along the length of the fold. The idea is to soften, not melt it. Once soft, a piece of wood is used to evenly apply pressure and fold the side over. Once folded, the plastic will need to be held in position until it cools.



3 Shaping is the realm of the disc/belt sander. For the serious modder this machine is an absolute 'must', as it will save hours of filing and sanding and deliver the perfect result every time. Profile shaping – rounding corners, etc. – can be performed with absolute precision on the disc attachment, and the support-table can be angled up to a 45-degree angle for chamfering joints. For concave shapes use the sanding belts end. Working with acrylic? You've got to get one!



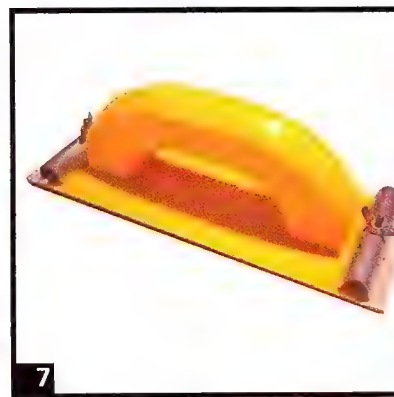
4 One of the hardest mods to get perfect is the obligatory fan-hole, especially when there is a wire guard screwed over the top. The guard is perfectly round, which accentuates any flaws in the shape of the hole. The answer is to use circular grinding wheels and drum-blocks that are as close to the diameter as possible to the hole. These can be used with a power drill or a die-grinder, however a variable speed router is perfect. . . if you can get the speed down below 4,000rpm.



5 At the other end of the scale is the home-made, hand-powered answer! A piece of 75mm PVC pipe, cut to shape and covered with a self-adhesive sanding disc. It is ideal for sanding out fan holes and other curved cuts. As with the sanding wheels, the advantage of using a curved sanding block is that there is less chance of elongating the hole into an ellipse, and corners will have a uniform radius. Just make sure that you keep the block at 90 degrees to the surface plane.



6 Once the corners are the right shape the next step is to sand any long cuts. This is an area that can make a mod look second-rate – larger holes, such as windows, which have sides full of waves, arcs and that, are 'out of square'. The answer is to use an orbital sander with a large, flat contact area, so the maximum area is sanded at the one time, keeping the edge straight and square. Occasionally running the sander into any rounded corners will give a smooth transition from 'straights' to 'curves'.



7 Orbital sander too expensive? Well, as per usual, there is a cheaper, manual method that works just as well. This is a sanding block I picked up at a disposal store for less than \$1.00, and it has one major advantage over the more expensive, electrically-powered solutions – it can be dipped into water if you are using Wet'n'Dry sandpaper. Don't try that with anything plugged into 240V. It's also good for working late at night without upsetting the sleepy neighbours!

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Cheers to Office Pro (www.office-pro.com.au) for giving Atomicans this choice opportunity.

Q: Why was Tom Hall fired?



⇒ Quake 3 signed by John Carmack

Remember the days when games were named by what was in them? Those days were blasted away when id released Quake. There wasn't a single earthquake to be found. Not even a subtle floor-shaking. If you too hungered for an earth-moving experience, then perhaps a signed copy of Quake 3 Arena, by High Lord John Carmack, will sate those shimming needs. Thanks to Discreet (www.discreet.com) for this pumping prize.

Q: Why was Paul Steed fired?

⇒ PSU cable sleeving

While rubber bands may be effective, they really do look like thin, brown, electron-eating skin slugs. Yes, go ahead and laugh, but you'll be wiping tears off your turtle-neck when they snap and leave little skin slug droppings on the bottom of your tower. Avoid this disgusting scenario and bag yourself a perfect PSU, all cable-sleeved and tight. It looks professional, clean and beautiful; and chances are, you'll be tempted to wed it.

Q: Why was John Romero fired?

⇒ Warcom wireless ADSL router

Mobility and speed; apparently, these are important when racing around your Aunt Gertie's chicken house. We aren't going to disagree; in fact, we think everything should be extra mobile and super speedy. Take ADSL routers for instance. With a built-in firewall and 802.11b wireless connectivity, and support for ADSL (of course), you can't get much more mobile or speedier. Big smiles to Netbro for supplying this terrific piece of hardware.

Q: Who did John Romero make his bitch after his wife left him?



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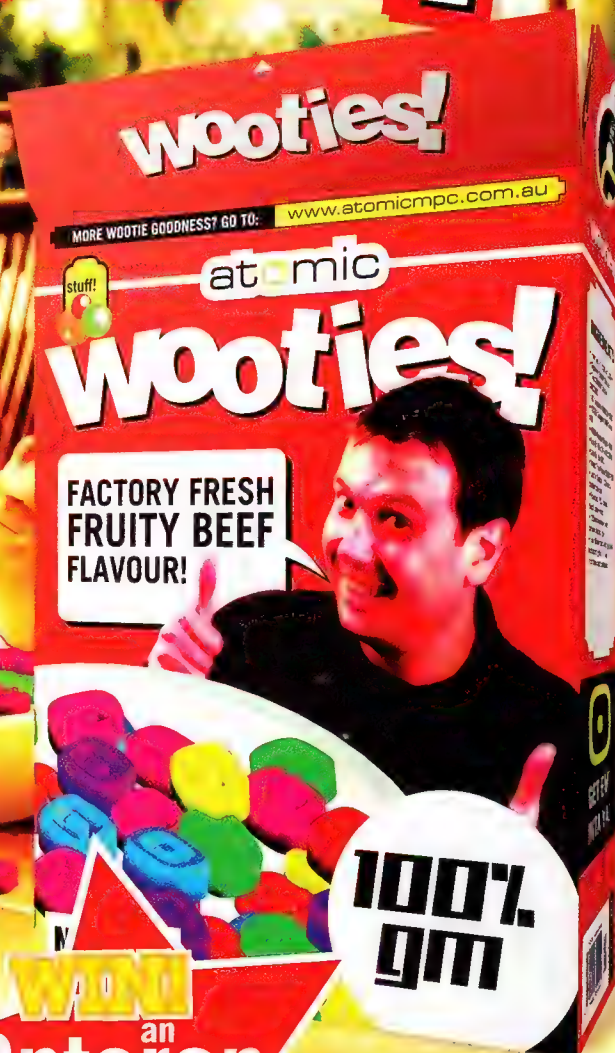
Atomic 30 winners: AOpen Disc Steno: Q. How do you get Pikachu to board a bus? A: You Pokemon. B Oliver, Chelmer, QLD. Rise of Nations: Q. What is blue and yellow and found at the bottom of a swimming pool? A: A baby with slashed floaties. Banks, Yerronga, QLD. A Archer, Trammere, TAS. B Leykam, Dee Why, NSW. A Weight, Moore Park, NSW. C Lei, Embleton, WA. C Miles, Gladstone, QLD. Splinter Cell: Q. How do a blonde's brain cells die? A. Alone. T Pavlic, Redwood Park, SA. S Testa, Duncraig, WA. R Stein, Armidale, NSW.

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Hype-eractive

John Simpson wonders how much hype there would be over commercial Lego porn.



Computer game hype. I haven't seen so much posturing and chest beating since my last blind date. Every magazine, Website or tech editor is sprouting guff about how the next round of PC games will turn your eyeballs to putty, complete with specular highlights.

The two biggest offenders are the soon-to-be-released Half Life 2, and the venerable Doom 3. Suddenly all the world thinks they need the latest shader hardware. I can just see kids throwing tantrums in computer stores: 'But mum, I want THAT pixel shader!'

Media hype, of course, is nothing new. The movie business has been doing it for years, releasing snippets of special effects and promo sheets that read just like a porn star's resume (eg: 'biggest opening in history'). Booksellers are also jumping on the wagon, with more advertising dollars and media coverage poured into the latest *Harry Potter* book than a royal wedding. It was only a matter of time before computer games joined the party.

The biggest question is: will the games live up to the hype? As a fan of game AI, I remember watching a similar lead-up to the release of Lionhead's *Black & White*. Previews suggested it would 'deliver an experience unlike any other' and herald a new age in computer autonomy.

Scoring a copy, one of my first thoughts was 'Lego people?' Then I met the creatures

— all cute and mewy — and discovered that I should probably never be a father. The number of times I whacked that little cow for eating villagers and crapping on houses defies belief. I guess it's little wonder it grew up to be red and horny (again, just like a porn star).

Anyway, suffice to say, the cow got my goat. I'm hoping for an improvement in the next game, *Black & White 2*. Previews say it's a vast improvement in graphics, AI and interaction. I just hope the creatures are smarter, or out comes the whacking stick.

As for the new games, D3 seems to be drawing the most attention, probably because its delivery date has changed more often than Julia Roberts' potential husbands. And it also seems to be getting the most spin doctoring. Todd Hollenshead, CEO of id Software, said in its first press release: 'DOOM 3 will change what people expect to see and experience in a PC game.'

Well, I don't know about you, but I expect to see fantastic graphics and have a fully-immersive experience. Why will my expectations change with D3? Maybe he's really saying: 'Don't get your expectations too high, 'cause all you'll be getting is the same old stuff, plus more vertex-shaded drool.' Sure, the 'leaked' screenshots look damn fine, and I can't believe John Carmack would release a new engine that doesn't cook GPUs. It's just that these days I'm...

well... a little skeptical.

Maybe it's time for the game companies to set an example and go against the hype. Play-down their future releases, so we're all pleasantly surprised. Here's an example (game companies, feel free to plagiarise):

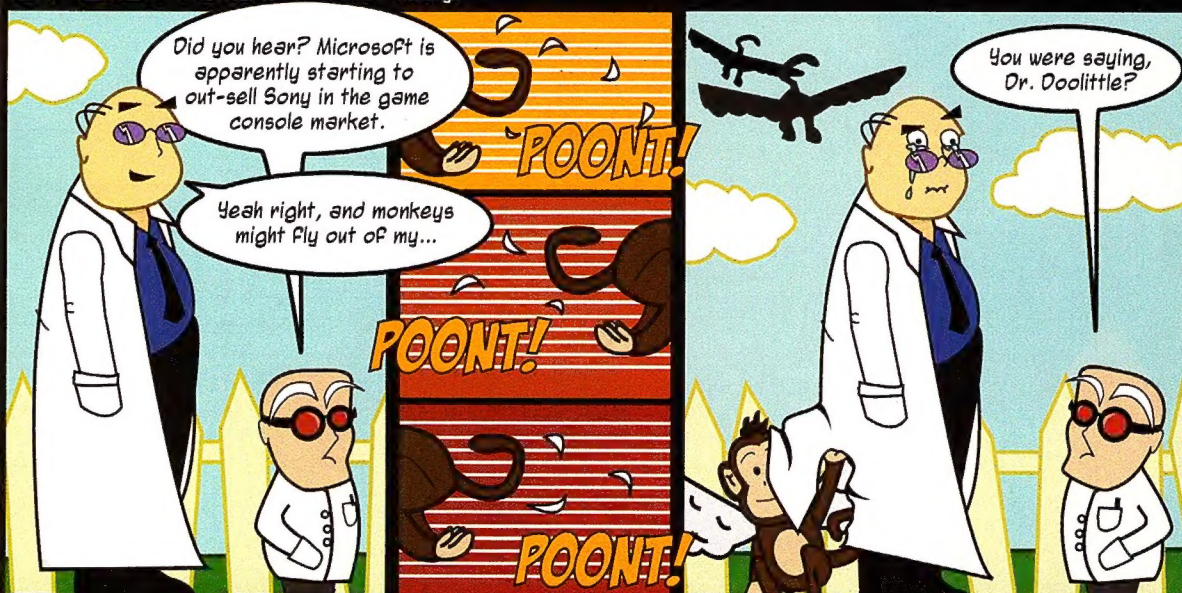
'[Insert game name] is not overly exciting. The graphics look a little ordinary, mainly because our artists spent most of their time at the coffee shop. Polygon count averages between five and seven per character, but can rise dramatically to nine if facial expressions are required.'

Game AI threatens to be unexciting, and occasionally stupid, with most opponents getting stuck behind doors or shooting each other. Dead characters will invariably have elbows or feet sticking through walls.

Physics takes a step backwards, literally, because we couldn't work out how to make the bad guys move forward. This should tie in well with the player's inability to turn his head. Or weapon. Or move. Which we believe will add a significant challenge to overall gameplay.'

See? Now expectations are set so low, you're bound to get excited when you play the real thing — although they may have a problem selling the game at all. I guess it's hard to compete in a world where advertising is king and the hype merchants run out in front, flinging pretty pink rose petals and blowing on big trumpets.

crashtest #5 - Really?



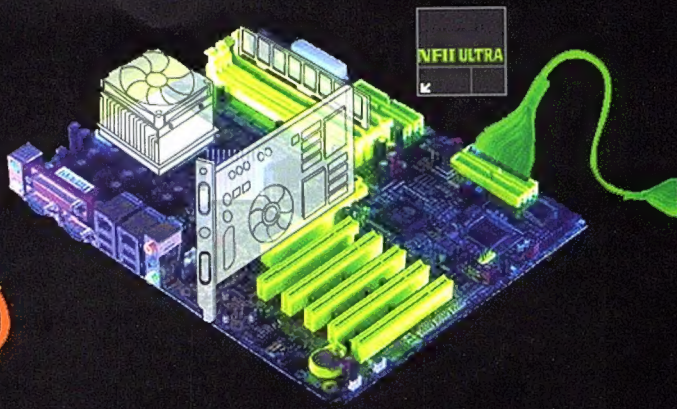
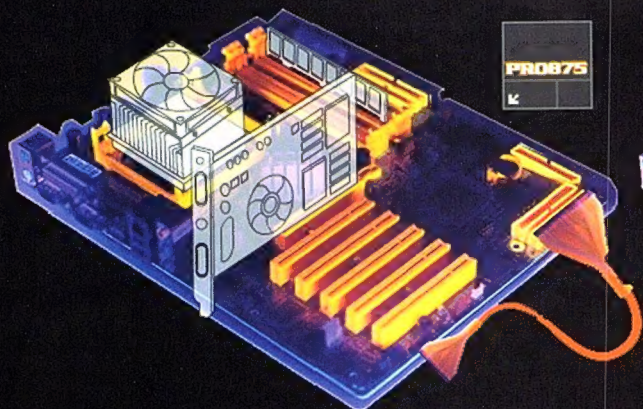
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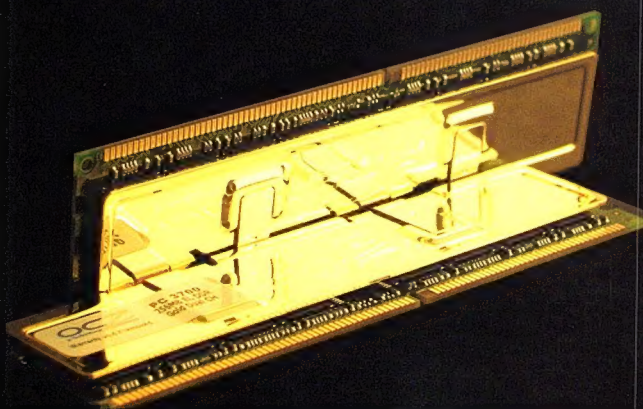


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- Fanless dual heatsink for videocard
- Unique heatpipe design
- Noiseless and maintenance-free operation
- Suitable for majority of videocards
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"...compatible with just about any current video card. ...this product does an excellent job at cooling" - www.3dgame.com

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- Pure copper base materials
- 92mm fan to maximise airflow
- Compatible with adjustable fan controller
- Intel Pentium 4 and AMD Athlon XP/64 compatible
- **Best of Comdex 2002 finalist**

"It's silent, it's incredibly powerful, nice to look at... So if you're thinking of buying an intel setup, regardless the fact to overclock it or to let it run at default speed: This is the way to go, no other silent cpu-cooler can even compete with this product." - www.datafuse.net



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